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To

Dr. B. E. Fernow

Compliments of an
admirer & one who received
his first lessons in forestr
under your able guidance.

George P. Ahern
Capt 9th Inf.
Chief of Forestry Bureau
Manila P. I.
Feb 17/04

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DEPARTMENT OF THE INTERIOR,

FORESTRY BUREAU—BULLETIN NO. 1.

CAPTAIN GEORGE P. AHERN, Chief of Bureau.

REPORT ON INVESTIGATIONS MADE IN JAVA IN THE YEAR 1902.

I. REPORT OF TRIP. II. PLANTÆ AHERNIANÆ. III. THE METHOD OF WORK ON THE FOREST FLORA OF JAVA. IV. THE BOTANICAL INSTITUTE AT BUITENZORG.

BY

ELMER D. MERRILL,

BOTANIST IN THE BUREAUS OF AGRICULTURE AND FORESTRY.

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR, FORESTRY BUREAU,
Manila, March 30, 1903.

SIR: I have the honor to transmit herewith the manuscript of a paper entitled "Report of Investigations made in Java in the Year 1902," by Elmer D. Merrill, Botanist, and recommend its publication as Bulletin No. 1.

Very respectfully,

GEORGE P. AHERN,
Captain, Ninth U. S. Infantry,
Chief of Forestry Bureau.

Hon. DEAN C. WORCESTER,
Secretary of the Interior.

LETTER OF SUBMITTAL.

DEPARTMENT OF THE INTERIOR, FORESTRY BUREAU,
Manila, December 3, 1902.

SIR: I have the honor to present herewith my report on the work accomplished in Java during the months of September, October, and November, 1902, under your letter of authorization and instruction, dated Manila, P. I., August 27, 1902.

Very respectfully,

ELMER D. MERRILL,
Botanist, Bureaus of Agriculture and Forestry.

Captain GEORGE P. AHERN,
Chief of Forestry Bureau, Manila P. I.

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REPORT ON INVESTIGATIONS MADE IN JAVA IN THE YEAR 1902.

By Elmer D. Merrill.

I. REPORT OF TRIP.

In accordance with my instructions, I left Manila on September 2, 1902, reaching Singapore on the morning of September 8. I left Singapore September 9, reaching Batavia on the morning of September 11, and as soon as practicable went to Buitenzorg, but being unable to secure hotel accommodations there, returned to Batavia. I remained in Batavia until the morning of September 15, on which date I returned to Buitenzorg. On my first visit to Buitenzorg, September 13, I called on Dr. Van Romburgh, Acting Director of the 's Lands Plantentuin, presented him with Captain Ahern's letter, and outlined the work which I wished to accomplish. Dr. Van Romburgh very kindly placed at my disposal all the facilities of the herbarium, garden, and library, so that on my return on September 15 I was able to begin work immediately.

As the chief object of my trip was to identify the botanical specimens in the herbarium of the Forestry Bureau, attention was given first to this work, the results of which are given in Part II, Plantæ Ahernianæ.

In addition to determining the above Forestry Bureau material, about 300 specimens of my own collection in the herbarium of the Bureau of Agriculture were identified.

The time from September 15 to November 15, with the exception of two days spent in a trip to Batavia to interview Dr. Bruisma, inspector-general of the forestry bureau for the Island of Java, was spent at Buitzenborg. This time was taken up for the most part in identifying the botanical material mentioned above, it being too limited to allow for the working out of all the critical species. On November 14, having completed all the work possible in the time allotted to me, I again went to Batavia, sailing that night for Singapore, where I arrived on the morning of November 17. I was obliged to wait for a Manila steamer until November 24. On that date I took the S. S. *Korat* for Manila, via Labuan, reaching Manila December 2.

In addition to my major work in identifying the botanical material mentioned above, a special report has been prepared (Part III) on Dr. Koorders's method of investigating the forest flora of Java, which includes

the method of determining the rate of tree growth, prevalence of species of economic importance, etc. In Part IV there has been included notes on the botanical garden, library, laboratories, herbarium, etc. Extensive notes not included in this report were also compiled regarding publications, with special reference to those that apply to the Philippines, and much library work, looking up references to the Philippine flora, publications of new species from the Archipelago, etc., was done.

Some 600 specimens of the botanical material which were taken to Buitenzorg were in duplicate. These were presented to the herbarium of the botanical garden, and in exchange for this material a similar collection of authentically named species in the garden are being prepared for the Forestry Bureau of the Philippine Islands. About 200 specimens were prepared while at Buitenzorg.

The catalogue of the garden was carefully perused and approximately 1,000 species were specified, of which specimens were desired. These are now being prepared and will be sent later. All the specimens which were marked are trees or shrubs. The greater part of them are also found in the Philippines. This material will be of the greatest value as a guide in identifying future Philippine collections. In addition to specimens of the trees and shrubs, I also personally collected specimens from all the species of grasses growing in the gardens and was allowed to take these specimens from the duplicates of Dr. Koorders's Java collections. These grass specimens will be of very great interest to the herbarium of the Bureau of Agriculture.

From Mr. Bruisma a report of the work of the forestry bureau, a catalogue of the library of the bureau, a copy of the forestry regulations, and maps showing the method of charting the "djati" (teak) forests were secured. This latter will be of special interest to the Bureau of Forestry.

At Buitenzorg a copy of the catalogue of the library was obtained, and also as complete a set as possible of the publications of the 's Lands Plantentuin. These publications include the "Mededeelingen" (contributions; "Verslag" (annual reports); "Icones Bogoriensis," and the "Bulletin." Many of these publications are of the greatest importance for our work on the Philippine forest flora. Especially to be noted are the seven volumes of the "Mededeelingen" by Koorders and Valeton on the forest flora of Java. These publications were secured in exchange for the publications of the Forestry Bureau of the Philippine Islands, which Bureau has been placed on the permanent mailing list of the 's Lands Plantentuin.

A full set of photographs were made at Buitenzorg, showing the buildings and laboratories connected with the 's Lands Plantentuin, the interior of the botanical museum, laboratories, etc., besides a series showing the general features of the botanical and experimental gardens.

During my stay at Singapore advantage was taken of the opportunity and some investigations were made of the botanical garden there. Dr.

H. N. Ridley, the director, very kindly placed the facilities of the institution at my disposal. As a result of this visit a large package of authentically named botanical material was received and arrangements were made for future exchange of botanical specimens.

II. PLANTÆ AHERNIANÆ.

INTRODUCTION.

The material upon which the present paper is based has been secured by the various field parties of the Forestry Bureau during the year 1901, and up to June, 1902. Realizing that little accurate work could be done on the many forestry problems presented in the Archipelago without first accurately identifying the component species of the forest flora, Capt. George P. Ahern, Chief of the Bureau, made an attempt to secure all the botanical material possible through his field parties, and, considering the conditions under which the work was done, met with considerable success. While it is unfortunate that the material could not have been collected under the direction of a trained botanist and properly cared for by such a person, still there is much of value in the collection, both from a scientific and an economic standpoint, as it forms the basis of our Philippine Herbarium, and enables us to accurately identify much of the material in the timber-testing laboratory of the Forestry Bureau.

The material considered in this paper, collected under the direction of Captain Ahern, has been credited to him, and the title of the present paper is derived from the name of the man who, although not a botanist, recognizes the pressing need and great value of thorough botanical work on the forest flora of this Archipelago.

Upon my appointment in the Bureau of Forestry in August, 1902, work was at once commenced arranging these specimens, completing the labels, etc. Difficulty was experienced, due to the fact that a large part of the material was without data other than the place of collection, and sometimes even this was wanting. Many of the packages had not been worked over, and as none of the specimens had been poisoned, much of the material was entirely destroyed by insects, while in other cases specimens that had not been properly dried had been rendered worthless by moisture. Much of the material was collected by persons who had little or no botanical training, and hence did not understand the necessity of securing complete botanical specimens. Accordingly, very few of the numbers cited in the following enumeration represent complete specimens, and for this reason it has been impossible to accurately determine much of the material. Many specimens consisted only of leaves, with no flowers or fruit, and such specimens, unless the material was especially characteristic or had the native name attached, were destroyed, the greater part of it being quite worthless for purposes of identification.

No attempt was made to match specimens so as to reduce the total number, but each separate specimen received an individual number. There were no notes regarding the size of the plants, habitat, altitude above the sea, or whether wild or cultivated. Practically all the numbers represent shrubs or trees, with one or two herbaceous and several climbing plants.

Owing to the very unfortunate fact that the herbarium and botanical library at Manila was destroyed by fire in 1897, before the American occupation, it was quite impossible to identify much of the material in Manila, and accordingly the trip mentioned above was planned in order to identify this botanical material and to take advantage of the many facilities afforded at the botanical garden at Buitenzorg.

At Buitenzorg there were rich collections from Borneo, Celebes, Moluccas, Java, Sumatra, the Malay Peninsula, and British India, but there was practically no Philippine material. Little trouble, however, was experienced in identifying those species of wide distribution. In the case of the endemic species, the lack of authentic specimens for comparison was keenly felt, a fact that has had much influence on the description of new species in the present paper. Only five species are described as new in the following article, yet manifestly much of the material that I have placed in the several genera without specific names, is undescribed. It is true that many of the numbers so treated do not represent complete botanical specimens, yet some of them are in good condition and would afford a basis for full and accurate descriptions. In most cases, however, with the lack of authentic Philippine material, it could not be ascertained with certainty whether or not the species had been described, and under the circumstances I have admitted such species without specific name.

The botanical material named below was collected mostly in the Islands of Luzon and Mindanao during the year 1901, and up to June, 1902. The greatest number of specimens from any one locality was obtained in Camarines Sur, Luzon, in the vicinity of Pasacao, some of the specimens being from that town, some from the barrio of Dalupaon, and some from a small river (Tinalmut) near Pasacao. As Dalupaon and Tinalmut are not given on the charts of the region, the specimens have all been credited to Pasacao. Other Luzon material is from the vicinity of Manila, the Province of Tarlac, and the Provinces of Zambales and Benguet. The Mindanao material was chiefly collected in the district of Zamboanga, presumably from the vicinity of the town of Zamboanga, although some were collected at Tetuan and some in the Province of Surigao, probably from the vicinity of the town of Surigao, while a few specimens came from Placer. Several specimens are also from Mount Apo in the district of Davao. One or two specimens from Jolo and Paragua, and considerable material from the Islands of Tinago, Bongao, and Dinagat are also included.

When one considers that for nearly two years the work of the Forestry Bureau in Manila has been based almost entirely on the native names for the various tree species—a system of names extremely variable in English-speaking countries but much more variable and unreliable in the Philippines—the necessity for the present work is evident. Owing to the great number of different dialects spoken, a single species has often been found to have eight, ten, twelve, or even fifteen different recorded native names. To further complicate matters, the same name is often applied to totally unrelated species in various sections of the Archipelago. Therefore, in order to establish a firm basis for the study and classification of the Philippine forest trees, it is absolutely essential to first learn the proper scientific names in order that the published articles on the use and value of the many species may become available. Take, for example, the Tagalog word "Molave," the most common of the thirteen recorded native names. applied to the valuable timber tree *Vitex littoralis* Decne. To anyone outside of the Philippine Islands this name conveys no meaning, and even to one in the Philippines the native name alone would be of no value whatever if he wished to look up the notes and articles that have been published regarding this species and to ascertain whether or not it is to be found in the markets of the world, what are its common names, if any, in such markets, its value, uses, etc. With the scientific name once determined, however, all the notes regarding this timber tree that have been published in English, German, Dutch, French, or Spanish, at once become available.

The question of naming the greater part of the Philippine material would be a comparatively simple one if there existed in Manila a good botanical library and herbarium. Until such institutions are established, the greater part of the work on the Philippine flora must be done at the great botanical centers in Europe, especially at Kew, Berlin, Paris, and Leyden, for at the botanical institutions in these places is to be found practically all the Philippine material that has been collected in the past. In the United States the Philippine material is very limited. The plants of the Wilkes United States Exploring Expedition are to be found at the Gray Herbarium, the United States National Museum, and the New York Botanical Garden. A partial set of Cuming's Philippine collection is at the Gray Herbarium, a partial set of Haenke's material at the St. Louis Botanical Garden, and a set of A. Loher's more recent collection is in the United States National Herbarium. The collection of the Spanish Forestry Commission, which was destroyed by fire in 1897, contained over 4,000 specimens of Philippine plants, collected by Señor Vidal, the chief of the commission, and named by him, with the collaboration of Mr. Rolfe of the royal gardens at Kew, England, a partial set of Cuming's Philippine material collected in the years 1836–1840, distributed by the British Museum, and many specimens from British India, the Malayan Archipelago, etc. To this botanical collection was added a very complete

library, selected with special reference to the Philippine flora. The destruction of this herbarium and library, together with all the notes and records of the Forestry Commission, was a very great loss to Philippine botany, and it is imperative that a new herbarium and a new botanical library be established. The plants of the present enumeration form the basis of the new herbarium, and a beginning has been made on the library which already contains the leading works on the Philippine flora and many of the standard reference works.

The present status of the Philippine flora is rather peculiar. On one hand we have Blanco's "Flora de Filipinas," with a large number of uncertain species or inidentifiable descriptions, and on the other hand we have Fernandez-Villar's "Novissima Appendix" to the third edition of Blanco's Flora, in which scores of species are credited to the Philippines which do not extend to the Archipelago, chiefly the species of British India. The genus *Pandanus* is a good illustration of the latter condition. Fernandez-Villar credits 17 species of *Pandanus* to the Philippines, while Dr. Warburg, a botanist who collected extensively in the Philippines, in his recent monograph of *Pandanaceæ*,[1] credits, and probably correctly so, but 14 species of the whole family to the Archipelago, several of which are there described as new, and 5 of Blanco's species considered as doubtful or at least unknown. The same condition obtains also in such genera as *Ficus*, *Eugenia*, etc. In consideration of the fact that there are now credited to the Philippines so many species that do not extend to the Archipelago, there is need of special care in identifications lest more species should be erroneously credited to the Islands. No doubt errors will be found in the identifications in this paper, but in cases where there was much doubt concerning the identity of any particular specimen it has been entered without specific name, often with the related species noted, and this is especially the case where the related species has not been previously credited to the Archipelago. The total number of specimens in the collection is 852; of these a considerable per cent were not in condition for accurate identification, and are not mentioned in the following paper, others are entered under their proper genera without specific names, when the material was in such condition that the genus could be accurately determined. Species accredited to the Philippines for the first time, regarding which especially careful identifications have been made, are in the following article preceded by an asterisk.

In the present enumeration there are represented 66 families, 225 genera, and about 400 species. Of these 400 species, 81 are presumably endemic to the Archipelago, 34 are reported from the Philippines for the first time, and 5 are described as new.

The sequence of families and genera is that adopted by Engler and Prantl in "Die Naturlichen Pflanzenfamilien."

[1] Engler's Pflanzenreich 3: 1900.

Of the species here reported from the Philippines for the first time, many represent interesting, and, in some cases, peculiar cases of geographical distribution. The following species were previously known only from Celebes: *Ficus minahassæ* Miq., *Wallaceodendron celebica* Koorders, *Gleditschia celebica* Koorders, *Acetephila gigantifolia* Koorders, *Cratoxylon celebicum* Blume, *Strychnos celebica* Koorders, *Couthovia celebica* Koorders, and *Clerodendron minahassæ* Teysm. and Binn.

The following species were previously known only from the Moluccas: *Casearia moluccana* Blume, *Lepiniopsis ternatensis* Valeton, *Clerodendron lanuginosum* Blume, *Ixora amboinica* Decne, *Albizzia littoralis*, T. and B.

From Java: *Luecosyke alba* Zoll. and Mor., *Parinarium scabrum* Aubl., *Picrasma javanica* Blume, *Saurauia reinwardtiana* Blume, *Albizzia tomentella* Miq., and *Hydnocarpus heterophylla* Blume, the latter also known from Sumatra.

From Borneo: *Shorea scrobiculata* Burck. Probably many other Philippine plants will be found in Borneo later when the flora is worked up. At present much of the Borneo material at Buitenzorg is undetermined.

From Burma, the Malayan Peninsula, and Sumatra: *Pinus khasya* Royle, *Walsura robusta* Roxb., and *Erythroxylon burmanicum* Griff.

Among the cases of geographical distribution of special interest must be noted the relatively large number of recently described Celebes species, which are here noted for the second time from the Southern Philippines; the discovery of *Lepiniopsis ternatensis* Valeton, in Mindanao; 4 distinct species of the genus *Pinus* from the mountains of Northern Luzon; and the discovery of *Hydnocarpus heterophylla* Blume, *Payena, leerii* B. & H. *Erythroxylon burmanicum* Griff., and *Walsura robusta* Roxb., in the Philippines.

One entire set of the material on which the following article is based is preserved in the herbarium of the Forestry Bureau in Manila, and so far as duplicates were available one set deposited in the herbarium of the Botanical Institute at Buitenzorg and one set in the United States National Herbarium at Washington, all this duplicate material being distributed under the numbers cited in this article.

PLANTÆ AHERNIANÆ.

[Enumeration of the species.]

CONIFEREÆ.

PINUS Linn.

P. insularis Endl. Syn. Conif. 157. 1847.

Luzon, Prov. Benguet, 830.

Ilocano, *Parua;* Igorrote, *Al-al.*

An endemic species also known from Lepanto and Nueva Ecija.

P. merkusii Jungh. and De Vriese, Pl. Nov. Ind. Bat. Or. 5. *t. 2.*

Luzon, Prov. Zambales, 829.

This species is from the mountains of Zambales; also questionably reported from Pangasinan.

Borneo and Sumatra.

P. khasya Royle ex Gord. in Lond. Gard. Mag **16**: 8. 1840.

Luzon, Prov. Benguet, 831.

Igorrote, *Saleng.*

Burma.

This species was credited to Luzon by F. Villar, Nov. App. 212, and evidently correctly so, as the specimen here referred to that species agrees very well with the published descriptions and figures of Royle's *Pinus khasya.* That this species should be found in Burma and again in Northern Luzon gives some cause for doubting the identity of the Burma and Luzon specimens. This species is closely related to *Pinus insularis* Endl.

P. sp. nov.?

Luzon, Prov. Benguet, 832, 833.

A species most distinct from other Philippine material, especially in the cones which are much larger than in any of the above species, being 10 cm. in length. No. 832 has an exceedingly rough cone. It was at first proposed to describe this species as new, but owing to the comparatively small amount of material, it has been considered advisable to wait until more material can be secured, and comparison made with authentic Asiatic material.

Previously but two species of *Pinus* have been generally credited to the Philippines, although F. Villar enumerates three, while in the present small collection under consideration we have four most distinct species. All these species are found in the mountainous regions in Northern Luzon, at altitudes above 1,000 meters. Possibly *Pinus merkusii* may later be found in the mountains of the southern part of the Archipelago, as its range outside of the Philippines extends much farther south than the province of Zambales, its only authentic locality in the in the Philippines.

GNETACEÆ.

GNETUM Linn.

Gnetum gnemon Linn. Mant. **1**: 125. 1771.
Mindanao, Prov. Surigao, 349, 410.
Malayan region.

MARANTACEÆ.

DONAX Lour.

D. arundastrum Lour. Fl. Cochinch. 15. 1790. (*Maranta arundinacea* Blanco, Fl. Filip. ed. 1, 7. 1837, non Linn.; *M. dichotoma* Wall. Cat. no. 6615. 1828.)
Mindanao, Prov. Zamboanga, 654.
Southern Asia and the Malayan region.

FAGACEÆ.

QUERCUS Linn.

Q. castellarnauiana Vidal, Rev. Pl. Vasc. Filip. 264. 1886.
Mindanao, Prov. Surigao, 527.
Endemic.

Q. philippinensis. A. DC. in DC. Prodr. **16**: pt. 2, 97. 1868.
Mindanao, Prov. Surigao, 432.
Visayan, *Uyayan*.
Wenzig[1] considers that *Quercus llanosii* A. DC., *Q. ovalis* Blanco, *Q. Blancoi* A. DC., and *Q. cyropoda* Miq., are all but forms of *Q. philippinensis* A. DC.
Endemic.

ULMACEÆ.

CELTIS Linn.

C. philippinensis Blanco, Fl. Filip. ed. 1, 197. 1837; Vidal, Sinopsis, *t. 85. f. A.* 1883.
Island of Dinagat, 466.
Endemic.

C. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 7. Specimen imperfect, flowers wanting.
Not *C. philippinensis* Blanco.

TREMA Lour.

T. amboinensis Blume, Mus. Bot. Lugd. Bat. **2**: 61. 1856.
Luzon, Prov. Tarlac, 707.
Himalayan region, Malayan Archipelago, etc.

MORACEÆ.

TAXOTROPHIS Blume.

T. ilicifolia Vidal, Rev. Pl. Vasc. Filip. 249. 1886.
Luzon, Province of Camarines Sur, Pasacao, 14.
Mindanao, Prov. Zamboanga, 386.
Visayan, *Cuyos-cuyos*.
Endemic.

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[1] Jahrb. Bot. Gart. Berlin, **4**: 231. 1886.

PLATE I.

FIG. 1.—THE BOTANICAL MUSEUM.

FIG. 2.—THE BOTANICAL MUSEUM, REAR VIEW.

PLATE II.

FIG. 1.—THE BOTANICAL MUSEUM, INTERIOR, MAIN FLOOR.

FIG. 2.—THE BOTANICAL MUSEUM, INTERIOR, FROM THE BALCONY.

STREBLUS Lour.

S. asper Lour. Fl. Cochinch. 615. 1790.
Mindanao, 310 bis.
Widely distributed in southern Asia, Malayan Archipelago, etc.

ARTOCARPUS Forst.

A. blumei Trec. Ann. Sc. Nat. III. **8**: 111. 1847.
Luzon, Prov. Camarines Sur, Pasacao, 2.
Java.

A. cumingiana Trec. l. c. 119. (*A. ovata* Blanco, Fl. Filip. ed. 1, 671, 1837 non-Noronh. 1790.)
Luzon, Prov. Camarines Sur, Pasacao, 119; Tarlac, 736; Prov. Bataan, Mariveles, 786; Mindanao, Prov. Surigao, 676.
Tagalog, *Anubing*.
Endemic.

A. incisa Linn. f. Suppl. 411.
Luzon, Prov. Bataan, Mariveles, 787; Mindanao, Prov. Zamboanga, 605.
Tagalog, *Antipolo*.
Widely distributed in southern Asia, Malayan Archipelago, etc.

A. integrifolia Linn. f. l. c. 412.
Mindanao, Prov. Surigao, 503.
Widely distributed.

A. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 41, 281.
Material very imperfect.

FICUS Linn.

Sect. **Pelæomorphe.**

F. pisifera Wall. Cat. no. 4504. 1828; King, Ann. Bot. Gard. Calcutta, **1**: 3. *pl. 1.* 1888.
Mindanao, Prov. Zamboanga, Tetuan, 544.
Malayan Peninsula and Archipelago.

Sect **Urostigma.**

F. pruniformis Blume, Bijdr. 451. 1825; King, l. c. 24. *pl. 21.*
Luzon, Prov. Camarines Sur, Pasacao, 157.
Malayan Peninsula, Java, and Sumatra.

F. altissima Blume, l. c. 444. King, l. c. 30. *pl. 30.* (*Urostigma altissima* Miq.; *F. laccifera* Roxb.)
Luzon, Prov. Camarines Sur, Pasacao, 172, 191, 798; Mindanao, Prov. Surigao, 509.
Himalayan region and Malayan Archipelago.

F. indica Linn. Sp. Pl. ed. 2, 1514. 1763, in part; King, l. c. 39. *pl. 45.*
Luzon, Prov. Camarines Sur, Pasacao, 151, 194, 270, 296; Mindanao, Prov. Surigao, 664.
Burma to the Malayan Archipelago.

* **F. indica** Linn. var. **gelderi** (Miq.) King, l. c. 39. *pl. 45.* (*Ficus gelderi* Miq. Ann. Mus. Lugd. Bat. **3**: 216, 287.)
Luzon, Prov. Camarines Sur, Pasacao, 23, 193.
Both numbers cited above have fruits larger than those described by Miquel and King.
Malayan Peninsula and Archipelago.

F. clusioides Miq. Ann. Mus. Lugd. Bat. **3**: 286. 1867; King, l. c. 42. *pl. 50.*
Mindanao, Prov. Surigao, 407.
Endemic.

F. retusa Linn. Mant. 129. 1771; King, l. c. 50. *pl. 61.*
Luzon, Prov. Camarines Sur, Pasacao, 176.
Southern Asia, Malayan Peninsula and Archipelago.

F. infectoria Roxb. Fl. Ind. **3**: 550. 1832; King, l. c. 60. *pl. 75.*
Luzon, Prov. Camarines Sur, Pasacao, 192.
India to Malayan region.

F. infectoria Roxb. var. **caulocarpa** (Miq.) King, l. c. 63. *pl. 79.* (*Urostigma caulocarpum* Miq. in Hook. Lond. Journ. Bot. **6**: 568. 1847.)
Mindanao, Prov. Surigao, 473.
Borneo.

* **F. callosa** Willd. Act. Acad. Berol. 102. *t. 4.* 1798; King l. c. 64. *pl. 85.*
Luzon, Prov. Camarines Sur, Pasacao, 153; Mindanao, Prov. Zamboanga, 622.
India to Malayan region.

Sect. **Sycidium.**

F. quercifolia Roxb. Fl. Ind. **3**: 534. 1832; King, l. c. 77. *pl. 95.*
Luzon, Prov. Camarines Sur, Pasacao, 174, 239; Mindanao Prov. Surigao, 347, 388.
An extremely variable species of wide distribution, common about Manila. *F. heterophylla* of Philippine authors, at least for most part, should doubtless be referred to this species.
Burma to Malayan Archipelago.

F. sp. indet. near *F. melinocarpa* Blume, Bijdr. 460; King l. c. 94. *pl. 119*, from Java and Sumatra.
Mindanao, Prov. Surigao, Placer, 698. Specimen imperfect.

* **F. ampelas** Burm. Fl. Ind. 226, 1768; King, l. c. 90. *pl. 114.*
Luzon, Prov. Camarines Sur, Pasacao, 823; Mindanao, Prov. Zamboanga, Tetuan, 396.
Malayan Archipelago.

F. cumingii Miq. Lond. Journ. Bot. **7**: 235. 1848. King, l. c. 92. *pl. 118.*
Mindanao, Prov. Zamboanga, 629.
Endemic. A most distinct species.

Sect. **Covellia.**

* **F. minahassæ** Miq. Ann. Mus. Lugd. Bat. **3**: 231, 296. 1867; King, l. c. 108. *pl. 140, 141.*
Mindanao, Prov. Zamboanga, 494; Prov. Davao, 682.
Moro (?) *Matanug.*
Both numbers cited above are without fruit, but in all other respects agree with authentic specimens of Miquel's species in Herb. Hort. Bot. Bog., and with King's description and plate. Previously known from North Celebes only.

F. leucantatoma Poir. in Lam. Encycl. Suppl. **2**: 654; King; l. c. 119. *pl. 157.*
Luzon, Prov. Bataan, Mariveles 773; Prov. Camarines Sur, Pasacao, 821.
Both numbers here referred to *Ficus leucantatoma* represent a narrow-leaved form.
Malayan Archipelago.

F. glomerata Blanco, Fl. Filip. ed. 1, 683. 1837, non Roxb.
Luzon, Prov. Bataan, Mariveles, 777. Mindanao, Prov. Surigao, 683, 305.

These two numbers represent a very distinct species, not figured by King, and which are here referred to *F. glomerata* Blanco, a name invalidated by that of Roxburgh. Owing to the doubt which exists regarding Blanco's species, and the confused state of synonomy in the genus, no new name is here given to this form.

Ficus spp. indet., mostly of the section *Urostigma*. 392 and 606 bis, from Mindanao, represent a most distinct species, with exceeding large coriaceous leaves, not figured by King, and probably an undescribed species. No. 139 from Camarines Sur, is also a very distinct form, not figured by King. The remaining material is mostly very imperfect, and not possible for me to identify at this time. Nos. 5, 107, 238, 336, 350, 574, 631, and 809.

URTICACEÆ.

PIPTURUS Wedd.

P. asper Wedd. Ann. Sc. Nat. IV. **1**: 197. 1854.
Luzon, Manila, 712; Prov. Camarines Sur, Pasacao, 154; Mindanao, Prov. Surigao, 665; Prov. Zamboanga, 619.
Endemic. Tagalog *Dalonod*.

VILLEBRUNEA Gaudich.

V. sp. indet., seems near *V. frutescens* Blume, Mus. Bot. Lugd. Bat. **2**: 168. 1856.
Mindanao, Prov. Zamboanga 365; Prov. Davao, Mt. Apo, 685.

LEUCOSYKE Mor.

* **L. alba** Zoll. and Mor. in Syst. Verz. Ind. Archip. 100. 1842.
Mindanao, Prov. Zamboanga, Tetuan, 361, 383.
Java.

L. capitellata Wedd. in DC. Prodr. **16**: pt. 2, 235[27]. 1869.
Luzon, Prov. Camarines Sur, Pasacao, 113; Mindanao, Prov. Zamboanga, 617.
Java.

NYCTAGINACEÆ.

PISONIA Linn.

P. umbellifera (Forst.) Seem. in Nadiaud. Fl. Tait. 46. (*P. excelsa* Blume.)
Luzon, Prov. Bataan, Mariveles, 754; Prov. Camarines Sur, Pasacao, 171, 286; Mindanao, Prov. Surigao, 346.
Malayan region to Australia, etc.

ANONACEÆ.

UVARIA Linn.

* **U. ovalifolia** Blume, Fl. Jav. Anon. 27. 1828.
Luzon, Prov. Camarines Sur, Pasacao, 186.
Java.

U. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 167.
The same as an unnamed specimen in Herb. Hort. Bot. Bog., from Celebes.

CANANGA Hook. f. and Thoms.

C. odorata (Lam.) Hook. f. and Thoms. Fl. Ind. **1**: 130. 1855.
Mindanao, Prov. Surigao, 455, 681.
Tagalog, *Ilang-ilang*.
Widely distributed in the Malayan Archipelago, Southern Asia etc.

ANAXAGOREA A. St. Hil.

A. luzonensis A. Gray, in Wilke's U. S. Expl. Exped. Bot. **1**: 27. 1854.
Luzon, Prov. Camarines Sur, Pasacao, 181. Mindanao, Prov. Surigao, 357.
Visayan, *Bagang-aso*.
Malayan region etc.

UNONA Linn. f.

U. discolor Vahl. Symb. Bot. **2**: 63. *t. 36*. 1798.
Luzon, Manila, 730.
A form very near this species and so referred.
Tropical Asia and the Malayan region.

PHÆANTHUS Hook. f. and Thoms.

P. cumingii Miq. Fl. Ind. Bat. **1**: pt. 2, 51. 1855.
Luzon, Manila, 742.
Endemic.

MITREPHORA Hook. f. and Thoms.

M. reticulata Hook. f. and Thoms. in Hook. Fl. Brit. Ind. **1**: 77. 1875.
Luzon, Prov. Bataan, Mariveles, 745.
Malayan Peninsula and Archipelago.

XYLOPIA Linn.

X. DEHISCENS (Blanco). (*Unona dehiscens* Blanco, Fl. Filip. ed. 1, 466. 1837; *Xylopia blancoi* Vidal, Sinopsis, *t. 5. f. C.* 1883.)
Luzon, Prov. Camarines Sur, Pasacao, 25, 125, 136.
Tagalog, *Lamutan*.
Endemic.

ANONA Linn.

A. muricata Linn. Sp. Pl. 536. 1753.
Mindanao, Prov. Surigao, 661.
Introduced from tropical America.

MYRISTICACEÆ.

GYMNACRANTHERA Warb.

G. sp. indet.
Mindanao, Prov. Zamboanga, Tetuan, 369, material very imperfect.

MYRISTICA Linn.

M. philippinensis Lam. Act. Paris. 161. 1788; Encycl. **4**: 387. 1797; Warburg, Monog. Myrist. 386. *t. 12. f. 1–8*, 1897. (*M. bracteata* A. DC. in DC. Prodr. **14**: 192. 1847; *M. luzonica* Blanco, Fl. Filip. ed. 1, 664. 1837.)
Mindanao, Prov. Zamboanga, Tetuan, 558.
Endemic; cultivated in Mauritius, Calcutta, Brazil, etc.

M. simiarum A. DC. in DC. Prodr. **14**: 191. 1847; Warburg, l. c. 397.
Mindanao, Prov. Zamboanga, Tetuan, 364, 573.
Endemic.

M. guatteriifolia A. DC. Ann. Sc. Nat. IV. **4**: 20. *t. 4.* 1855; Prodr. l. c., 193; Warburg, l. c., 412. *t. 13. f. 1–4.*
Luzon, Prov. Camarines Sur, Pasacao, 20; Mindanao, Prov. Zamboanga Tetuan, 590.
Philippine Islands, also Island of Labuan north coast of Borneo.

M. cumingii Warb. Monog. Myrist. 442. *t. 13.* 1897. (*M. iners* Blume, in A. DC. l. c. 190. pp.)
Mindanao, Prov. Surigao, 421. Luzon, Prov. Bataan, Mariveles, 758.
Tagalog, *Malatalang.*
Endemic.

M. mindanænsis Warb. l. c. 497. *t. 13.*
Mindanao, Prov. Zamboanga, Tetuan, 393, 589.
Endemic.

M. sp. indet.
Mindanao, Prov. Zamboanga, 363. Material too imperfect for accurate identification.

MONIMIACEÆ.

KIBARA Endl.

K. coriacea (Blume) Perk. in Engler's Bot. Jahrb. **25**: 575. 1898.
Mindanao, Prov. Zamboanga, 371, 850.
Java and Celebes.

In the recent monograph by Perkins and Gilg.[1] no species of this family is credited to the Philippines, although this species is reported by Vidal, No. 950. The specimens here referred to *K. coriacea* differ somewhat from the description of Perkin's and Gilg.

LAURACEÆ.

CINNAMOMUM Blume.

C. mercadoi Vidal, Rev. Pl. Vasc. Filip. 224. 1886. (*C. iners* F. Vill. Nov. App. 180, non Reinw.)
Luzon, Prov. Camarines Sur, Pasacao, 50.
Endemic.

C. sp. indet.
Mindanao, Prov. Zamboanga, 647.

PHOEBE Nees.

P. sp. indet. Seems to be *P. umbelliflora* Blume, but the material is very imperfect.
Luzon, Prov. Camarines Sur, Pasacao, 127.

DEHAASIA Blume.

D. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 130. Material very imperfect.

HERNANDIACEÆ.

HERNANDIA Linn.

H. peltata Meissn. in DC. Prodr. **15**: pt. 1, 263. 1864.
Luzon, Prov. Camarines Sur, Pasacao, 17; Mindanao, Prov. Surigao, 409, 458.
Southern Asia, Malayan region, etc.

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[1] Engler's Pflanzenreich, **4**: 1901.

MORINGACEÆ.

MORINGA Juss.

M. oleifera Lam. Encycl. **1**: 398. 1783. (*M. pterygosperma* Gaertn. Fruct. **2**: 314. 1791.)
Luzon, Prov. Bataan, Mariveles, 768.
Tagalog, *Malunggay.*
Asia.

PITTOSPORACEÆ.

PITTOSPORUM Banks.

P. sp. indet. Closely related to *P. ferrugineum* Dry., which extends from the Malayan Peninsula and Archipelago to Australia, but differs in certain characters.
Mindanao, Prov. Zamboanga, Tetuan, 373.

ROSACEÆ.

PYGEUM Gaertn.

P. latifolium Miq. Fl. Ind. Bat. **1**: pt. 1. 361. 1855.
Mindanao, Prov. Zamboanga, Tetuan, 367.
Malayan Archipelago.

PARINARIUM Aubl.

***P. scabrum** Hassk. Flora, **27**: 585. 1844.
Mindanao, Prov. Surigao, 375.
A Javanese species, which No. 375 resembles very closely, and to which it is referred, differing in some slight characters.

CONNARACEÆ.

CONNARUS Linn.

C. trifoliatus (Turcz.) Rolfe, in Vidal, Rev. Pl. Vasc. Filip. 103. 1886. (*Anisostemon trifoliatus* Turcz. Bull. Soc. Nat. Mosc. **20**: pt. 1, 152. 1847; *C. Rolfei* Vidal Planerog. Cuming. 23, 106. 1885.)
Luzon, Prov. Camarines Sur, Pasacao, 218.
Endemic.

LEGUMINOSÆ.

GLIRICIDIA H. B. K.

G. maculata H. B. K. Nov. Gen. et Sp. Pl. **6**: 393. 1823.
Luzon, Prov. Bataan, Balagna, 309.
A species introduced from Central America and now widely distributed in the Philippines commonly known as *madre cacao.*

SERIANTHES Benth.

S. grandiflora (Wall.) Benth. in Hook. Lond. Journ. Bot. **3**: 225. 1844. (*Inga grandiflora* Wall.)
Island of Dinagat. 447.
Throughout the Malayan region.

PITHECOLOBIUM Mart.

P. dulce (Willd.) Benth. l. c. 199. (*Inga dulcis* Willd.)
Luzon, Prov. Bataan, Mariveles, 763.
Tagalog, *Camanchiles.*
A native of tropical America, now widely distributed in the Philippines.

P. lobatum (Grah.) Benth. l. c. 208. (*Inga lobata* Grah.)
Mindanao, Prov. Zamboanga, Tetuan, 555.
Malayan Peninsula and Archipelago.

P. acle (Blanco.) Vidal, Rev. Pl. Vasc. Filip. 121. 1886. (*Mimosa acle* Blanco, Fl. Filip. ed. 1, 738. 1837.)
Luzon, Prov. Camarines Sur, Pasacao, 74, 142.
Tagalog, *Acle.*
Endemic.

WALLACEODENDRON Koorders.

***W. celebica** Koorders, Mededeel.'s Lands. Plant. **19**: 630. 1898.
Luzon, Prov. Camarines Sur, Pasacao, 49 bis.
A monotypic genus, previously known only from the original collection at Minehassa, Northeast Celebes.

ALBIZZIA Durazz.

A. lebbek. (Willd.) Benth. in Hook. Lond. Journ. Bot. **3**: 87. 1844.
Luzon, Manila, 741, 721.
Widely distributed in the Tropics.

***A. littoralis** Teysm. and Binn. Tijdschr. Ned. Ind. **29**: 259. 1866.
Luzon, Prov. Camarines Sur, Pasacao, 69.
A species extending from Java to the Moluccas and Celebes.

A. procera (Willd.) Benth. l. c. 89. (*Acacia procera* Willd.)
Luzon, Prov. Bataan, Balagna, 601, 846.
Tagalog, *Alalangat.*
Widely distributed in the Malayan region.

A. lucida (Roxb.) Benth. l. c. 86. (*Mimosa lucida* Roxb.)
Mindanao, Prov. Surigao, 678.
Southern Asia and the Malayan region.

***A. tomentella** Miq. Fl. Ind. Bat. **1**: pt. 1, 20. 1855.
Mindanao, Prov. Surigao, 395. Previously known from Java.

A. sp. indet. near *A. julibussen* Durazz., but the material is very imperfect.
Luzon, Manila, 743.

PARKIA R. Br.

P. roxburghii G. Don. Gen. Syst. **2**: 397. 1834.
Luzon, Tarlac, 702.
Tagalog, *Cupang.*
Tropical Asia, Malayan region, etc.

SINDORA Miq.

S. wallichii Benth. in Hook. Icones, t. 1017–18.
Island of Dinagat, 439.
Singapore and Malacca.

TAMARINDUS Linn.

T. indica Linn. Sp. Pl. 34. 1753.
Mindanao, Prov. Surigao, 315; Prov. Zamboanga, 446.
Tagalog, *Sampaloc.*
A common species about towns; cultivated. Tropical Asia, Africa etc.

AFZELIA Smith.

A. bijuga (DC.) A. Gray, in Wilke's U. S. Expl. Exped. Bot. **1**: 467. *t. 51.* 1854. (*Outea bijuga* DC.)
Luzon, Prov. Camarines Sur, Pasacao, 208.
Tagalog, *Ipil.*
Distributed throughout the Malayan region, to Australia. A valuable timber tree.

A. rhomboidia Vidal, Phanerog. Cuming. 110. 1885.
Luzon, Prov. Camarines Sur, Pasacao, 146. Island of Culion, 704.
Endemic. A valuable timber tree. Tagalog, *Tindalo.*

CASSIA Linn.

C. florida Vahl. Symb. Bot. **3**: 57. 1794.
Luzon, Manila, 711.
Malayan region, etc.

GLEDITSCHIA Scop.

***G. celebica** Koorders, Mededeel. 's Lands Plant. **19**: 435. 1898.
Luzon, Prov. Camarines Sur, Pasacao, 62.
A species previously known only by the original collection from North Celebes. Related to *G. rolfei* Vidal, but quite distinct.

CÆSALPINIA Linn.

C. pulcherrima (Linn.) Sw. Obs. 166. 1791. (*Poinciana pulcherrima* Linn.)
Mindanao, Prov. Surigao, 521.
Usually found about towns. Introduced.
Tropics of both hemispheres, native country not clearly known.

C. sappan Linn. Sp. Pl. 381. 1753.
Luzon, Prov. Bataan, Mariveles, 771.
Tagalog, *Sibucao.*
Tropical Asia, Malayan region.

SOPHORA Linn.

S. tomentosa Linn. Sp. Pl. 373. 1753.
Luzon, Prov. Camarines Sur, Pasacao, 213.
A species found near the seacoast in the Tropics of both hemispheres.

INDIGOFERA Linn.

I. teysmanni Miq. Fl. Ind. Bat. **1**: pt. 1, 1083. 1855.
Luzon, Prov. Camarines Sur, Pasacao, 234, 235. Mindanao, Prov. Surigao, 434.
Malayan Archipelago.

I. tinctoria Linn. Sp. Pl. 751. 1753.
Luzon, Prov. Camarines Sur, Pasacao, 227.
Widely distributed in the Tropics and cultivated for indigo.

DESMODIUM Desv.

D. umbellatum (Linn.) DC. Prodr. **2**: 325. 1825. (*Hedysarum umbellatum* Linn.)
Luzon, Prov. Camarines Sur, Pasacao, 222; Mindanao, Prov. Surigao, 408.
Seychelles, southern Asia, Malayan Archipelago etc., to Australia,

DALBERGIA Linn. f.

D. ferruginea Roxb. Hort. Beng., 98. 1814.
Mindanao, Prov. Zamboanga, 632.
Southern Asia, Malayan region.
D. ferruginea Roxb., is cited by Baker in Hook. f. Fl. Brit. Ind. **2**: 237, as a synonym of *D. stipulacea* Roxb., but is here held a distinct species.

PONGAMIA, Vent.

P. glabra Vent. Jard. Malm. 28. *t. 28.* 1803.
Luzon, Prov. Camarines Sur, Pasacao, 46, 206. Mindanao, Prov. Surigao, 496; Prov. Zamboanga, Tetuan, 581; Island of Tinago, 420.
A species found near the seacoasts from the Seychelles to Australia.

ERYTHRINA Linn.

E. indica Lam. Encycl. **2**: 391. 1786.
Luzon, Prov. Camarines Sur, Pasacao, 30; Mindanao, Prov. Davao, Mt. Apo, 675.
From British India, through the Malayan region to Australia.

OXALIDACEÆ.

AVERRHOA Linn.

A. carambola Linn. Sp. Pl. 428. 1753.
Mindanao, Prov. Surigao, 522.
This species, as well as *A. bilimbi* Linn., is commonly cultivated about towns in the Philippines, and is widely distributed in the Tropics.

ERYTHROXYLACEÆ.

ERYTHROXYLON Linn.

* **E. burmanicum** Griff. Notul. **4**: 468. 1849.
Luzon, Prov. Camarines Sur, Pasacao, 12, 292.
Visayan, *Manambo.*
Burma, Malayan Peninsula, and Sumatra.

RUTACEÆ.

EVODIA Forst.

EVODIA MINDANÆNSIS Merrill, sp. nov.
A shrub or small tree with axillary inflorescence and thin, membranous, pale-green, trifoliate leaves. Young branches terete, densely puberulent. Petioles 10 to 11 cm. long, opposite, pubescent; leaflets very thin, nearly sessile, ovate, short acuminate, the rounded base slightly cordate, glabrous above except on the pubescent mid-nerve, pubescent on the nerves beneath, 12 to 20 cm.

long, 8 to 10 cm. wide, lateral nerves about 14 pairs, rather prominent, anastomosing near the margin. Panicles narrow, about equaling the petioles, the primary branches 1 to 2 cm. long, densely pubescent. Flowers small, on short (1–2 mm.) puberulent pedicels. Sepals 4, rounded, pubescent, about 1 mm. long. Petals 4, about 2.5 mm. long, ovate, acute, punctate. Stamens glabrous, exceeding the petals. Ovary hirsute. Carpels 4, about 3 mm. long, sparingly pubescent.

Type specimen collected at Tetuan, Prov. of Zamboanga, Mindanao, No. 592, also 301 from Surigao, Mindanao, is referred here. A species characterized by its rather large, very thin pale-green leaves. No. 301 is in fruit, and is placed here as it agrees with the type in all characters of inflorescence and vegetation, except that the leaves are somewhat smaller, not exceeding 12 cm. in length.

Visayan, *Bintoco*.

E. sp. indet.

Very near *Evodia minahassæ* Koorders, from North Celebes, but possibly distinct. Specimen with fruit only.

Mindanao, Prov. Surigao, 435.

E. sp. indet.

Material very imperfect.

Luzon, Prov. Camarines Sur, Pasacao, 128.

LUNASIA Blanco.

L. amara Blanco, Fl. Filip. ed. 1, 783. 1837.

Mindanao, Prov. Zamboanga, Tetuan, 559, 643.

Endemic.

GLYCOSMIS Correa.

G. pentaphylla Correa, Ann. Mus. Par. **6**: 386. 1805.

Luzon, Manila, 725.

From tropical Asia to Australia.

MICROMELUM Blume.

M. tephrocarpum Turcz. Bull. Soc. Nat. Mosc. **31**: pt. 1, 379. 1858. (*M. glabrescens* F. Vill. Nov. App. 36, non Benth.)

Mindanao, Prov. Surigao, Placer, 380, 401; Prov. Zamboanga, Tetuan, 381.

Celebes.

M. molle Turcz. l. c. 380?

Mindanao, Prov. Zamboanga, 368.

Endemic.

M. sp. indet.

Mindanao, Prov. Zamboanga, 591, 624.

CLAUSENA Burm.

C. excavata Burm. Fl. Ind. 87. *t. 29*. 1768.

Luzon, Prov. Camarines Sur, Pasacao, 49.

Southern Asia and the Malayan region.

TRIPHASIA Lour.

T. aurantiola Lour. Fl. Cochinch. 152. 1790.

Mindanao, Prov. Surigao, 524.

Tropical Asia and the Malayan region.

CITRUS Linn.

C. hystrix DC. Cat. Hort. Monsp. 97. 1813.
Luzon, Prov. Camarines Sur, Pasacao, 91; Mindanao, Prov. Surigao, 519.
Southern Asia and the Malayan region.

C. sp indet.
Mindanao, Prov. Surigao, 366.

SIMARUBACEÆ.

BRUCEA J. F. Mill.

B. sumatrana Roxb. Hort. Beng. 12. 1814.
Mindanao, Prov. Surigao, 512.
Tropical Asia to Australia.

PICRASMA Blume.

***P. javanica** Blume, Bijdr. 248. 1825.
Mindanao, Prov. Surigao, Placer, 696; Prov. Zamboanga, Tetuan, 557.
Java.

AILANTHUS Desf.

A. moluccana DC. Prodr. **2** : 89. 1825.
Luzon, Prov. Camarines Sur, Pasacao, 93.
No. 93 differs somewhat from this species, especially in the fruit, but is very close to *A. moluccana*, and is so referred.
Moluccas.

BURSERACEÆ.

CANARIUM Linn.

C. cumingii Engl. in DC. Monog. Phanerog. **4** : 132. 1883.
Mindanao, Prov. Surigao, 697.
Endemic.

C. commune Linn. Mant. **1** : 127. 1771.
Mindanao, Prov. Surigao, 334.
From India to the Malayan Peninsula, Java to North Celebes. No. 334 seems to agree very well with this species. *Canarium comune* Blanco, non Linn., is *C. cumingii* Engl.

C. sp. indet. Related to *Canarium legitimum* Miq., from Amboina, but quite distinct.
Luzon, Prov. Camarines Sur, Pasacao, 117; Prov. Bataan, 789.

C. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 63, 134, 788.

MELIACEÆ.

TOONA M. Roem.

Toona ciliata Roem. Syn. Hesper. 139. 1846. (*Cedrela toona* Roxb. ex Rottl. in Ges. Naturf. Fr. Neue Schr. **2** : 198. 1803.)
Luzon, Prov. Camarines Sur, Pasacao, 73.
British India, Malayan Peninsula and Archipelago.

XYLOCARPUS Koen.

***X. obovatus** (Blume) A. Juss. Mem. Mus. Paris, **19**: 244. 1830. (*Carapa obovata* Blume, Bijdr. **1**: 179. 1825.)

Luzon, Prov. Camarines Sur, Pasacao, 268; Mindanao, Prov. Surigao, 505; Island of Dinagat, 80, 483.

Widely distributed along the seashores in the Tropics of the Old World. *X. Granatum* Koen., is also found in the Philippines.

SANDORICUM Cav.

S. indicum Cav. Diss. **7**: 359. *tt. 202, 203.* 1801.

Mindanao, Prov. Zamboanga, Tetuan, 459.

Tropical Asia and the Malayan region.

S. sp. indet.

Luzon, Prov. Camarines Sur, Pasacao, 228. "A species not found in Java nor in Northeast Celebes."—Koorders.

DYSOXYLUM Blume.

D. sp. indet.

Very near, and perhaps identical with *D. arborescens* Miq., which extends from Java and Sumatra to North Celebes, but the material is very imperfect.

Luzon, Prov. Camarines Sur, Pasacao, 813.

D. sp. indet.

Mindanao, Prov. Surigao, 642.

CHISOCHETON Blume.

C. tetrapetalus Turcz. Bull. Soc. Nat. Mosc. **1**: 411. 1858.

Luzon, Prov. Bataan, Mariveles, 761; Prov. Camarines Sur, Pasacao, 9; Mindanao, Prov. Surigao, Placer, 406.

Java.

C. sp. indet. Mindanao, Prov. Surigao, 533, 585. Material very imperfect.

AMOORA. Roxb.

A. sp. indet. Apparently identical with an unnamed specimen, No. 12328, Teysmann, from Celebes in Herb. Hort. Bot. Bog.

Mindanao, Prov. Surigao, 324.

AGLAIA Lour.

A. sp. indet., seems very near *A. ganggo* Miq., from Sumatra.

Island of Dinagat. 481.

A. sp. indet., in some respects very close to *A. cleptica* Blume, from the Malayan region.

Island of Tinago, 422; Mindanao, Prov. Zamboanga, 638.

A. sp. indet. The same as an unnamed specimen, No. 12338, Teysmann, in Herb. Hort. Bot. Bog., from Celebes.

Mindanao, Prov. Zamboanga, 535, 563.

A. sp. indet. A very distinct form, in fruit only.

Luzon, Prov. Camarines Sur, Pasacao, 18.

"Neither in Java nor in Northeast Celebes."—Koorders.

A. spp. indet. 8, 123, 245, 247, 415, 487, 536, 551, 667.

WALSURA Roxb.

*W. robusta Roxb. Hort. Beng. 32. 1814.
Luzon, Prov. Camarines Sur, Pasacao, 108, 264.
A species extending from the Himalayan region to Burma, and the Andaman Islands.
Some hesitation was felt in referring the Philippine specimens to this species, the only one in the section (*Surwala*), although in all but one or two minor details the material here referred to *Walsura robusta* agrees very well with the published descriptions and with the Asiatic material so named, in Herb. Hort. Bot. Bog.

MALPHIGIACEÆ.

TRISTILLATEIA Thou.

T. australasica A. Rich. Sert. Astrolab. 38. *t. 35.* 1834.
Luzon, Camarines Sur, Pasacao, 184.
Visayan, *Bagnit.*
Malacca, Malayan Archipelago to Australia.

EUPHORBIACEÆ.

ACTEPHILA Blume.

*A. gigantifolia Koorders, Mededeel 's Lands Plant. **19**: 625. 1898.
Mindanao, Prov. Surigao, 690.
A species previously known only from the type collection, northeast Celebes.

PHYLLANTHUS Linn.

P. distichus (Linn.) Muell. Arg. in DC. Prodr. **15**: pt. 2, 413. 1866. (*Cissa disticha* Linn.)
Luzon, Manila, 709.
Tagalog, *Banguiling* or *Iba.*
Tropical Asia, the Malayan region, etc.

P. reticulatus Poir. in Lam. Encycl. **5**: 298. 1804.
Luzon, Manila, 726; Prov. Camarines Sur, Pasacao, 197, 803 bis; Mindanao, Prov. Zamboanga, Tetuan, 560.
Widely distributed in the Tropics.

GLOCHIDION Forst.

G. cumingii Muell. Arg. Linnæa, **32**: 61. 1863.
Luzon, Prov. Camarines Sur, Pasacao, 149, 271.
Endemic.

G. DIVERSIFOLIUM (Miq.) *Phyllanthus diversifolius* Miq. Fl. Ind. Bat. Suppl. 448. 1861.
Luzon, Prov. Camarines Sur, Pasacao, 161, 274; Mindanao, Prov. Zamboanga, 616.
Java and Sumatra.

G. molle Blume, Bijdr. 586. 1825. (*Phyllanthus mollis* Muell. Arg.)
Luzon, Prov. Camarines Sur, Pasacao, 173.
Java to Celebes.

*G. **littorale** Blume, Bijdr. 585. 1825. (*Phyllanthus littoralis* Muell. Arg.)
Mindanao, Prov. Surigao, 402, 502, 526.
Malayan Peninsula and Java.

G. sp. indet. Near *G. arborescens* Blume, from Java, but distinct.
Mindanao, Prov. Surigao, 460.

G. spp. indet. Owing to imperfect material, and lack of material for comparison, many species in this difficult genus have not been determined, Nos. 160, 162, 185, 202, 280, 323, 342, 343, 351, 474, 825.

SAUROPUS Blume.

SAUROPUS ANDROGYNUS (Linn.). *Clutia androgyna* Linn. Mant. **1**: 128. 1767. *Sauropus albicans* Blume, Bijdr. 596. 1825.
Luzon, Prov. Camarines Sur, Pasacao, 288.
India and the Malayan region.

CYCLOSTEMON Blume.

C. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 11.
Flowers only. No. 182 is also questionably referred to this genus.

BACCAUREA Lour.

B. tetrandra (Baill.) Muell. Arg. in DC. Prodr. **15**: 465. 1866. (*Adenocrepis tetrandra* Baill.)
Luzon, Prov. Bataan, Mariveles, 760.
Endemic.

ANTIDESMA Linn.

A. ghœsembilla Gaertn. Fruct. **1**: 169. *t. 39.* 1788.
Luzon, Prov. Camarines Sur, Pasacao, 188, 796, Mindanao, Prov. Zamboanga, Tetuan, 612.
Africa to the Malayan region and Australia.

A. sp. indet. Seems very near to a sterile specimen from North Celebes, No. 16803 Herbarium Koordersianum in Herb. Hort. Bot. Bog., also somewhat resembles *A. lanceolatum* Tul.
Luzon, Prov. Camarines Sur, Pasacao 817. Specimen in fruit.

A. sp. indet. Very near *Antidesma* "No. 2" Koorders. Mededeel 's Lands Plant. **19**: 58. No. 16854 Koorders, from North Celebes.
Tinago Island, No. 418, specimen in fruit.

BRIDELIA Willd.

B. ovata Decne. Nouv. Ann. Mus. Par. **3**: 484. 1835.
Mindanao, Prov. Zambonga, 372, 641.
Malayan Peninsula and Archipelago to Australia.

CROTON Linn.

C. leiophyllus Muell. Arg. Linnæa. **34** : 103. 1865–66.
Mindanao, Prov. Zamboanga, Tetuan, 571.
A species closely related to *C. laevifolius* Blume.
Endemic.

C. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 265.

CLAOXYLON A. Juss.

C. sp. indet. Very near *C. rubescens* Miq.
Luzon, Prov. Camarines Sur, Pasacao, 266, 293.

C. sp. indet. Related to *C. longifolium* Muell. Arg., and may be identical with this species, but the material is too poor for accurate identification.
Mindanao, Prov. Zamboanga, 556.

C. sp. indet. May be referable to *Claoxylon indicum* Hassk.
Mindanao, Prov. Surigao, 499.
Visayan, *Sagay*.

MALLOTUS Lour.

M. moluccanus (Linn.) Muell. Arg. Linnæa, **34**: 185. 1865–66. (*Croton moluccanus* Linn.)
Luzon, Manila, 715; Prov. Camarines Sur, Pasacao, 48, 260. Mindanao, Prov. Zamboanga, 394.
Malayan region.

M. paniculatus (Lam.) Muell. Arg. l. c. 189. (*Croton paniculatus* Lam.)
Luzon, Prov. Camarines Sur, Pasacao, 87, 232.
Malayan Peninsula and Archipelago, etc.

M. philippinensis (Lam.) Muell. Arg. l. c. 192. (*Croton philippinensis* Lam.)
Mindanao, Prov. Zamboanga, 633.
India, Malayan region to Australia.

M. ricinoides (Pers.) Muell. Arg. l. c. 195. (*Croton ricinoides* Pers.)
Luzon, Prov. Camarines Sur, Pasacao, 326. Mindanao, Prov. Zamboanga, 578; Prov. Davao, 674.
Southern Asia, Malayan region, etc.

M. sp. indet. Near *M. playfairii* Hemsley. Material very imperfect.
Luzon, Manila, 732; Prov. Camarines Sur, Pasacao, 412.

ALCHORNIA Swartz.

A. javensis Muell. Arg. Linnaea, **34**: 170. 1865–66.
Mindanao, Prov. Zamboanga, 589, 620, 649.
Java.

CLEIDION Blume.

***C. javanicum** Blume, Bijdr., 613. 1825.
India, Malayan Archipelago, etc.
Luzon, Prov. Camarines Sur, Pasacao, 51, 285, 816.

MACARANGA Thou.

M. bicolor Muell. Arg. Linnaea, **34**: 199. 1865–66.
Mindanao, Prov. Surigao, 390.
Endemic.

M. tanarius (Linn.) Muell. Arg. in DC. Prodr. **15**: pt. 2, 997. 1866. (*Ricinus tanarius* Linn.)
Mindanao, Prov. Surigao, 307.
Southern Asia, Malayan region to Australia.

M. tanarius var. **tomentosa** Muell. Arg. l. c.
Luzon, Manila, 722; Prov. Camarines Sur, Pasacao, 114; Mindanao, Prov. Zamboanga, 625.
Malayan Archipelago.

M. sp. indet. A very distinct, strongly hispid species, but the material is too imperfect for accurate identification.
Mindanao, Prov. Surigao, 816.

ACALYPHA Linn.

A. stipulacea Klotzsch. Nov. Act. Acad. Nat. Cur. Suppl. **19**: 416. 1843.
Mindanao, Prov. Surigao, 312; Luzon, Prov. Camarines Sur, Pasacao, 165.
Moluccas.

A. sp. indet. Near *A. celebica* Blume.
Mindanao, Prov. Surigao, 338.

A. sp. indet. Near *A. minahassæ* Koorders, from Celebes.
Luzon, Prov. Camarines Sur, Pasacao, 815.

HOMONOIA Lour.

H. riparia Lour. Fl. Cochinch. 637. 1790.
Luzon, Prov. Camarines Sur, Pasacao, 159.
Southern Asia, Malayan region, etc. Common on river bars throughout the Philippines.

ALEURITES. Forst.

A. moluccana Willd. Sp. Pl. **4**: 590. 1805.
Mindanao, Prov. Zamboanga, Tetuan, 397.
Southern Asia, Malayan region, etc.

CODIÆUM A. Juss

C. variegatum Blumè, Bijdr. 606. 1825.
Mindanao, Prov. Zamboanga, 644. Cultivated.
Malayan region.

GELONIUM Roxb.

G. sp. indet. Near, but distinct from *G. bifarium* Roxb.
Luzon, Prov. Camarines Sur, Pasacao, 599.

EXCŒCARIA Linn.

E. agallocha Linn. Syst. Nat. ed. 10. 1288. 1758–59.
Luzon, Prov. Camarines Sur, Pasacao, 115.
Tropical Asia, Malayan region, etc.

HOMALANTHUS Juss.

H. fastuosus (Muell. Arg.) F. Vill. Nov. App. 196. 1880. (*Carumbium fastuosum* Muell. Arg.)
Mindanao, Prov. Surigao No. 513; also Prov. of Zamboanga No. 385.
Visayan, *Bayante.*
Endemic.
A species related to *Homalanthus giganteus*, from Java, but differing especially in its entirely glabrous leaves, more numerous stamens, and nearly spherical fruits.

EUPHORBIA Linn.

E. atoto Forst. f. Prodr. 36. 1797. (*E. halophila* Miq.)
Luzon, Prov. Camarines Sur, Pasacao, 263.
On seacoast, tropical Asia to Australia, etc.

PLATE III.

FIG. 1.—HERBARIUM BUILDING, FOREST FLORA INVESTIGATIONS.

FIG. 2.—LABORATORY FOR SYSTEMATIC BOTANY, FOREST FLORA INVESTIGATIONS.

PLATE IV.

FIG. 1.—OFFICE OF THE EXPERIMENT GARDEN.

FIG. 2.—AROID HOUSE.

ANACARDIACEÆ.

BUCHANANIA Spreng.

B. florida Schauer, Nov. Act. Nat. Cur. Suppl. **19**: 481. 1843.
Luzon, Prov. Camarines Sur, Pasacao, 36; Mindanao, Prov. Surigao, 426, 507.
Tagalog, *Ligas*.

B. florida Schauer, var. **arborescens,** Engler, in DC. Monog. Phanerog. **4**: 189. 1883.
Mindanao, Prov. Zamboanga, 610; Island of Dinagat, 442.

B. florida Schauer, var. **petiolaris** Engler, l. c.
Luzon, Prov. Bataan, Mariveles, 764; Prov. Camarines Sur, Pasacao, 827.
A variable species, extending from tropical Asia to the Malayan region.

MANGIFERA Linn.

M. odorata Griff. Notul. **4**: 417. 1849.
Mindanao, Prov. Zamboanga, 658.
Malayan region.

M. cæsia Jack. in Roxb. Fl. Ind. ed. Carey **2**: 441.
Mindanao, Prov. Surigao, 345; Prov. Zamboanga, 660. Long-petioled forms.
Malayan region.

M. sp. indet.
Luzon, 89; Mindanao, 651. No flowers or fruit.

ANACARDIUM Linn.

A. occidentale Linn. Sp. Pl. 383. 1753.
Luzon, Prov. Bataan, Mariveles, 784.
Introduced from tropical America and now extensively cultivated and spontaneous in the Archipelago; known by the natives as *casoy* or *cachui*.

KOORDERSIODENDRON Engl.

KOORDERSIODENDRON PINNATUM (Blanco) *Helicteres pinnata* Blanco, Fl. Filip. ed. 1, 384. 1837; *Cyrtocarpa quinquestila* Blanco, l. c., ed. 2, 269. 1845; *Odina speciosa* Blume, Mus. Bot. Lugd. Bat. **1**: 206. 1849–51; *Koordersiodendron celebicum* Engl. in Mededeel. 's Lands Plant. **19**: 410. 1898; Boerlage in Icon. Bogor. **4**: 55. *pl. 94, 95*. 1901.
Luzon, Prov. Camarines Sur, Pasacao, 121.
Tagalog, *Amuguis*.
A monotypic genus, extending from the Philippines to Celebes and New Guinea.

SEMECARPUS Linn. f.

S. perrottetii March, Rev. Anarc. 169. 1869.
Luzon, Prov. Bataan, Mariveles, 769; Manila, 716. Mindanao, Prov. Zamboanga, 510, 537, 587, 600.
Celebes.

Semecarpus gigantifolia F. Vill. Nov. App. 350. 1883; Vidal, Sinopsis, Atlas, t. 36, A. f. A. 1883.
Mindanao, Prov. Surigao, 511.
Endemic.

S. MACROPHYLLA Merrill, sp. nov.
A tree, with very large obovate leaves, ample terminal panicles, striate branches and stout, flattened petioles 1.5 cm. long, 8 to 10 mm. broad. Leaves obovate, obtuse, tapering to the cuneate base and rounded apex,

4 to 6 dm. long, 2 dm. wide, firm, coriacious, glabrous and shining above, densely short-pubescent throughout beneath, but especialy on the nerves, midnerve prominent, secondary nerves 18 to 22, prominent, subparallel and somewhat arcuate, extending to the margins, tertiary nerves freely anastomosing. Panicles densely brown-tomentose, becoming glabrous, 5 dm. long, the primary branches spreading the lower ones about 1.5 to 2 dm. long. Fruit, broadly obovate, truncate, and in drying sulcate at the apex, 2.5 to 3.5 cm. long, 2 to 2.5 cm. thick, covered with a dense brown tomentum. Calyx lobes persistent, lanceolate, acute, 5 to 6 mm. long, densely tomentose. Flowers unknown.

Type specimen No. 348, Surigao, Mindanao, also No. 526 from the same locality belongs here.

A most distinct species, recognized by its large leaves, which are pubescent beneath, its brown-tomentose panicles, fruit, etc.

S. sp. indet.

Luzon Prov. Bataan, Mariveles, 746.

CELASTRACEÆ.

LOPHOPETALUM Wight.

L. sp. indet. A species closely related to *L. toxicum* Loher, Icones Bogoriensis **1**: *t. 16*. 1897, from central Luzon, but differing somewhat in the inflorescence and floral characters. It is perhaps even more closely related to *L. celebica* Koorders, Mededeel, 's Lands Plant. **19**: 623. 1898, differing somewhat from that species in the inflorescence and leaves.

Mindanao, Prov. Zamboanga, 565.

GYMNOSPORIA Benth. and Hook. f.

G. montana Benth. Fl. Austral. **1**: 400. 1863.

Luzon, Prov. Camarines Sur, Pasacao, 98.

Widely distributed in the Tropics.

ICACINACEÆ.

GONOCARYUM Miq.

G. sp. indet. Seems very near *G. teysmanniannm* Scheff., from the Malayan Archipelago.

Luzon, Prov. Camarines Sur, Pasacao, 86.

STAPHYLEACEÆ.

TURPINIA Vent.

T. sp. nov.?

Mindanao, Prov. Surigao, 354.

A species related to, but quite distinct from, both *T. sphaerocarpa* Blume, and *T. pomifera* DC. Specimen in fruit.

SAPINDACEÆ.

ERIOGLOSSUM Blume.

E. edule Blume, Bijdr. 229. 1825.

Luzon, Prov. Camarines Sur, Pasacao, 135, 215. Mindanao, Prov. Zamboanga, 614.

Tropical Asia and the Malayan region.

OTOPHORA Blume.

O. PINNATA (Blanco) *Capura pinnata* Blanco, Fl. Filip. ed 1, 644. 1837; *C. pupurata* Blanco, Fl. Filip, ed. 2, 184. 1845, non Linn.; *Otolepis nigrescens* Turcz. Bull Soc. Nat. Mosc. **21**: 572. 1848; *Capura nigrescens* Vidal, Rev. Pl. Vasc. Filip. 97. 1886.
Luzon, Prov. Bataan, Mariveles, 750.
Endemic.

TRISTIRA Radlk.

T. triptera (Blanco) Radlk. Act. Congr. Bot. Amst. (1877) 133. 1879. (*Melicocca triptera* Blanco.)
Luzon, Prov. Camarines Sur, Pasacao, 200.
Endemic.

NEPHELIUM Linn.

N. longana (Lam.) Cambess, Mem. Mus. Paris, **18**: 30. 1829. (*Euphoria longana* Lam.)
Luzon, Prov. Bataan, Mariveles, 756; Prov. Camarines Sur, Pasacao, 79.
Tagalog, *Alupag* or *Halupac.*
Tropical Asia.

N. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 204.

ELLATOSTACHYS Radlk.

E. verrucosa (Blume) Radlk. Sitzb. Acad. Muench. **9**: 601. 1879. (*Cupania verrucosa* Blume, Rumphia, **3**: 161. 1825.)
Mindanao, Prov. Zamboanga, 530, 604.
Java.

LEPIDOPETALUM Blume.

L. sp. indet
Mindanao, Prov. Zamboanga, 546, 562.
Specimens in fruit, very closely related to *L. subdichotomum* Radlk., from German New Guinea, Hollrung No. 337 in Herb. Hort. Bog. Bogor.

HARPULLIA Roxb.

H. blancoi F. Vill. Nov. App. 53. 1883.
Luzon, Prov. Camarines Sur, Pasacao, 43.
In Index Kewensis, *Harpulia blancoi* and its numerous synonyms is reduced to *H. cupanoides* Roxb., but here following Vidal, is held distinct.
Endemic.

VITACEÆ.

VITIS Linn.

V. adnata Wall. Cat. No. 5998. 1828.
Luzon, Prov. Camarines Sur, Pasacao, 230.
Tagalog, *Bulacan.*
Tropical Asia, Malayan region to Australia.

V. sp. indet. Seems near *V. javanica* Spreng, but the material is very poor and imperfect.
Luzon, No. 294.

LEEA Linn.

L. javanica Blume, Bijdr. 197. 1825.
Luzon, Prov. Camarines Sur, Pasacao, 190, 805. Mindanao, Prov. Surigao, 332.
Malayan region.

L. sambucina Willd. Sp. Pl. **1**: 1177. 1797.
Mindanao, Prov. Surigao, 310.
Appears to be a large-leafed form of this species, which is found throughout the Tropics of the Old World.

L. sp. indet.
Mindanao, Prov. Surigao, 668; Prov. Zamboanga, 582. Specimens very imperfect.

ELÆOCARPACEÆ.

ELÆOCARPUS Linn.

* **E. floribundus** Blume, Bijdr. 120. 1825.
Mindanao, Prov. Surigao, 403.
Tropical Asia.

E. sp. indet. Near *E. floribundus* Blume, but distinct.
Surigao, 382. No. 352 from Surigao represents another species, immature, and therefore not possible to identify readily.

MUNTINGIA Linn.

M. calabura Linn. Sp. Pl. 509. 1753.
Manila, 719.
A species introduced from Mexico, and now common about towns.

TILIACEÆ.

DIPLODISCUS Turcz.

D. paniculatus Turcz. Bull. Soc. Nat. Mosc. **31**: pt. 1, 235. 1858.
Luzon, Prov. Camarines Sur, Pasacao, 10. Mindanao, Prov. Surigao, 376.
A monotypic endemic genus.

GREWIA Linn.

G. lævigata Vahl. Symb. Bot. **1**: 34. 1790.
Luzon, Prov. Camarines Sur, Pasacao, 214.
Tropical Asia and Africa, Malayan region.

G. sp. indet.
Manila, No. 734. A form related to *G. lævigata*, but with much smaller leaves than that species; Pasacao, No. 55, probably an undescribed species.

COLONA Cav.

C. serratifolia Cav. Ic. **4**: 47 *t.* 370. 1797. (*Columbia americana* Pers. Syn. Pl. **2**: 66. 1807; *C. serratifolia* DC. Prodr. **1**: 512. 1824; *C. inequalerata* Turcz. Bull. Soc. Nat. Mosc. **31**: 233. 1858; *C. anilao* Blanco, Fl. Filip. ed. 1, 654. 1837.)
Luzon, Prov. Camarines Sur, Pasacao, 90, 792. Mindanao, Prov. Zamboanga, 639; Prov. Surigao, 320; Prov. Davao, 673.
Tagalog, *Anilao*.
A variable endemic species. *C. javanica* is perhaps not specifically distinct from this species.

C. sp. nov.?
Luzon, Prov. Bataan, Mariveles, 749.

MALVACEÆ.

HIBISCUS Linn.

H. tiliaceus Linn. Sp. Pl. 694. 1753.
Luzon, Manila, 739, 793; Prov. Camarines Sur, Pasacao, 94, 333. Mindanao, Prov. Surigao, 824.
Tagalog, *Banalo.*
Widely distributed in the Tropics.

THESPESIA Soland.

F. macrophylla Blume, Bijdr. 73. 1825.
Luzon, Prov. Camarines Sur, Pasacao, 147, 209.
Tropical Asia, Africa, the Malayan region, etc.

GOSSYPIUM Linn.

G. herbaceum Linn. Sp. Pl. 693. 1753.
Mindanao, Prov. Surigao, 510 bis; Bongao Island, 843.
Tagalog *Gapas, Cuebas.*
Cultivated.

BOMBACACEÆ.

CEIBA Medik.

Ceiba pentandra Gaertn. Fruct. **2**: 244. *t. 133.* 1791. (*Eriodendron anfractuosum* DC.)
Luzon, Prov. Camarines Sur, Pasacao, 4.
Tropical Africa and Asia, the Malayan region, etc.

STERCULIACEÆ.

MELOCHIA Linn.

M. corchorifolia Linn. Sp. Pl. 675. 1753.
Mindanao, Prov. Surigao, 688.
Widely distributed in the Tropics of both hemispheres.

M. arborea Blanco, Fl. Filip. ed. 1, 524. 1837. (*M. velutina* Bedd.)
Mindanao, Prov. Surigao, 340; Prov. Zamboanga, 630.
Visayan, *Banitlon.*
Endemic.

COMMERSONIA Forst

C. platyphylla Andr. Bot. Rep. *tt. 603, 519.* 1799–1811.
Mindanao, Prov. Surigao, 684.
Malayan region.

PTEROSPERMUM Schreb.

P. diversifolium Blume, Bijdr. 88. 1825.
Luzon, Prov. Camarines Sur, Pasacao, 15.
Tagalog, *Bayoc* or *Bayog.*
Southern Asia and the Malayan region.

P. blumeanum Korth, in Nederl. Kruidk. Arch. **1**: 311. 1848.
Luzon, Prov. Camarines Sur, Pasacao, 66. Mindanao, Prov. Zamboanga, 542, 640.
Visayan, *Bayuc-bayucan* or *Bayog-bayog.*
Sumatra and Java.

KLEINHOVIA Linn.

K. hospita Linn, Sp. Pl. ed. 2, 1365. 1763.
Luzon, Prov. Bataan, Balanga, 847; Prov. Camarines Sur, Pasacao, 822. Mindanao, Prov. Surigao, 328; Prov. Zamboanga, 636.
Visayan, *Tuag*.
Tropical Asia and the Malayan region.

STERCULIA Linn.

S. laevis Wall. Cat. No. 1138. 1828.
Luzon, Manila, 713.
Malayan Peninsula, Java.

S. stipularis R. Br. in Benn. Pl. Jav. Rar. 232. 1844.
Luzon, Prov. Camarines Sur, Pasacao, 249.
Endemic.

S. sp. indet.
Luzon, Manila, 710, 724.
A species apparently near *S. peltata* Blume, but differing in some essential characters.

S. sp. indet.
Mindanao, Prov. Camarines Sur, Pasacao, 207.
A form near and probably identical with *S. halmahairæ* Scheff., from the Island of Halmahaira.

S. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 60.

TARRIETIA Blume.

T. SYLVATICA (Vidal). (*Heritiera sylvatica* Vidal, Rev. Pl. Vasc. Filip. 66. 1886; *Sterculia nobilis* F. Vill. non R. Br.)
Luzon, Prov. Camarines Sur, Pasacao, 88.
Tagalog, *Dungon*.
Endemic.

The proper genus of this plant was indicated to me by Dr. S. H. Koorders, and while in Java I drew up a description of the species with the intention of dedicating it to Dr. Koorders. On my return to Manila, however, I had occasion to look up the description of *Heritiera sylvatica* Vidal, while identifying another specimen, and consider that No. 88 of this collection is identical with Vidal's species, and that the proper genus is *Tarretia* rather than *Heritiera*. I have not seen the type material of Vidal's species, which will be found in the Kew herbarium. This species is perhaps most closely related to *T. simplicifolia* Mast., from the Malayan Peninsula, at least in the vegetative characters of its simple leaves, but from which it is distinguished by its much smaller, narrower, acute or acuminate leaves which are silvery white beneath, smaller fruits, etc. From all the other described species in the genus it differs in its unifoliate leaves.

PETEROCYMBIUM R. Br.

P. javanicum R. Br. in Benn. Pl. Jav. Rar. 219. *t. 45*. 1844. (*Sterculia campanulata* Wall.)
Luzon, Prov. Camarines Sur, Pasacao, 124.
Tagalog *Talotó*.
Burma, Malayan Peninsula and Archipelago.

HERITIERA Ait.

H. littoralis Dryand, in Ait. Hort. Kew. **3**: 546. 1789.
Luzon, Prov. Camarines Sur, Pasacao, 65. Mindanao, Prov. Surigao, 413.
Tagalog, *Dungon late.*
Widely distributed in the Tropics.

DILLENIACEÆ.

DILLENIA Linn.

D. philippinensis Rolfe, Journ. Linn. Soc. Bot. **21**: 307. 1884.
Luzon, Prov. Camarines Sur, Pasacao, 54; Prov. Bataan, Mariveles, 781.
Tagalog, *Catmon.*
Endemic.

D. philippinensis Rolfe, Var.?
Mindanao, Prov. Surigao, 308; Prov. Zamboanga, 836.
A form with the under sides of the leaves, young branches, and sepals pubescent or hirsute. Perhaps a distinct species.

SAURAUIA Willd.

* **S. reinwardtiana** Blume, Bijdr. 128. 1825.
Mindanao, Prov. Surigao, 337.
Java.

THEACEÆ.

TERNSTRŒMIA Mutis.

T. toquian F. Vill. Nov. App. 19. 1883.
Luzon, Prov. Camarines Sur, Pasacao, 57.
This species seems very near to *T. aneura* Miq.
Celebes.

GUTTIFERÆ.

CRATOXYLON Blume.

***C. celebicum** Blume, Mus. Bot. Lugd. Bat. **2**: 16. 1856.
Luzon, Manila, 728. Mindanao, Prov. Surigao, 358.
Celebes.

C. floribundum (Turcz.) F. Vill. Nov. App. 16. 1883 (*Ancistrolobus floribundus* Turcz.)
Luzon, Tarlac, 737; Prov. Camarines Sur, Pasacao, 828.
Endemic.

C. sp. indet.
Luzon, 31; Mindanao, 655.

CALOPHYLLUM Linn.

C. inophyllum Linn. Sp. Pl. 513. 1753.
Luzon, Prov. Camarines Sur, Pasacao, 22, 735.
Tagalog, *Palomaria.*
Widely distributed in the Tropics.

C. wallichianum Planch. and Triana, Mém. Gutt. 272. 1862.
Pasacao, Prov. Camarines Sur, Luzon. 53, 144, Feb.-March, 1902; also collected at Mariveles, Prov. Bataan, Luzon, 579, Jan. 21, 1902.
Tagalog, *Palo-maria* or *Palo maria de monte*.
A very distinct species, at once recognized by the peculiar brown-tomentose branches, inflorescence, and sepals.

C. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 240.

GARCINIA Linn.

G. cumingli Pierre, Fl. Forest. Cochinch. Enum. **11**: *t. 78. f. F. E.*
Luzon, Prov. Camarines Sur, Pasacao, 231.
Endemic.

G. duodecandra Pierre, l. c. **28**: *t. 84. f. E.*
Luzon, Prov. Camarines Sur, Pasacao, 195.
Tagalog, *Gatisan*.
Endemic.

G. sp. indet.
Luzon, 78. 259.

DIPTEROCARPACEÆ.

SHOREA Roxb.

* **S. scrobiculata** Burck, Ann. Jard. Bot. Buitenz. **6**: 207. 1887.
Mindanao, 840.
Identical with the type material of Burck's species, 2538, 2917 Beccari, from Borneo, in Herb. Hort. Bot. Bog.

S. spp. indet.
Luzon, 104, 129; Mindanao, 356.

DIPTEROCARPUS Gaertn. f.

D. sp. indet.
Luzon, Prov. Bataan, Mariveles, 755.
Tagalog, *Panao*.

BIXACEÆ.

BIXA Linn.

B. orellana Linn. Sp. Pl. 512. 1753.
Luzon, Manila 740.
Introduced from America.
Tagalog, *Achiote*.

FLACOURTIACEÆ.

HYDNOCARPUS Gaertn.

***H. heterophylla** Blume, Rumphia, **4**: 22. *t. 178 B. f. l.* 1848. (*Taraktogenos blumei* Hassk.)
Luzon, Prov. Camarines Sur, Pasacao, 111, 287.
Visayan, *Butong manoc*.
Java and Sumatra.

RYPAROSA Blume.

R. sp. indet.
Mindanao, Prov. Surigao, 416.
Material very imperfect.

SCOLOPIA Schreb.

S. sp. indet. Very near *S. roxburghii* Clos.
Island of Dinagat, 482.

HOMALIUM Jacq.

H. villarianum Vidal, Rev. Pl. Vasc. Filip. 142. 1886.
Luzon, Prov. Camarines Sur, Pasacao, 24, 72. Mindanao, Prov. Surigao, 469.
Tagalog, *Aranga*.
Endemic.

FLACOURTIA Juss.

F. cataphracta Roxb. in Willd. Sp. Pl. **4**: 830. 1804.
Mindanao, Prov. Surigao, 471.
Tropical Asia and the Malayan region.

F. sp. indet. Near *F. ramontchi* L'Herit.
Luzon, Tarlac, 703.

CASEARIA Jacq.

C. cinerea Turcz. Bull. Soc. Nat. Mosc. **31**: 462. 1858.
Luzon, Manila, 729.
Endemic.

***C. moluccana** Blume, Mus. Bot. Lugd. Bat. **1**: 255. 1849–1851.
Mindanao, Prov. Surigao, 414; Island of Dinagat, 467.
Amboina.

C. sp. indet.
Luzon, 64, 276.

DATISCACEÆ.

OCTOMELES Miq.

O. sumatrana Miq. Fl. Ind. Bat. Suppl. 336. 1860.
Luzon, Prov. Camarines Sur, Pasacao, 16.
According to Warburg, the Philippine material represents a distinct species, *D. moluccana* Warb., which extends from the Philippines to Amboina, Celebes and New Guinea, *Q. sumatrana* Miq., being confined to the western portion of the Malayan Archipelago.

THYMELÆACEÆ.

GYRINOPSIS Decne.

G. cumingiana Decne. Ann. Soc. Nat. II. **19**: 41. *t. 1.* 1843.
Luzon, Prov. Camarines Sur, Pasacao, 236.
A monotypic endemic genus, previously known only from the original collection, Misamis, Mindanao; 1617 Cuming.

PHALERIA Jack.

P. cumingii (Meissn.) F. Vill. Nov. App. 183. 1883. (*Drimyspermum cumingii* Meissn.)
Luzon, Prov. Camarines Sur, Pasacao, 150, 282, 283. Mindanao, Prov. Zamboanga, 575.
Endemic.

LYTHRACEÆ.

PEMPHIS Forst.

P. acidula Forst. Char. Gen. 68. *t. 84.* 1776.
Luzon, Prov. Camarines Sur, Pasacao, 168, 178, 251.
A widely distributed species, found on the seacoasts from East Africa, Southern Asia, to Australia, etc.

LAGERSTRŒMIA Linn.

L. speciosa (Linn.) Pers. Syn **2**: 72. 1807. (*Munchausia speciosa* Linn; *L. flos-reginæ* Retz.)
Luzon, Tarlac, 701. Mindanao, Prov. Surigao, 302.
Tagalog, *Banaba.*
Southern Asia to Australia.

L. batitinan Vidal, Rev. Pl. Vasc. Filip. 139. 1886. (*L. heptaptera* Vidal, Sinopsis, *t. 52. f. A.*, non Miq.)
Luzon, Prov. Camarines Sur, Pasacao, 137. Mindanao, Prov. Davao, Mt. Apo. 680.
Endemic.

LAWSONIA Linn.

L. inermis Linn. Sp. Pl. 349. 1753. (*L. alba* Lam.)
Mindano, Prov. Zamboanga, 611, 634.
Widely distributed in the tropical region of the Old World, introduced in the Philippines, and commonly cultivated for ornament, also growing wild about towns etc.

SONNERTIACEÆ.

SONNERATIA Linn. f.

S. pagatpat Blanco, Fl. Filip. ed. 1, 424. 1837.
Luzon, Prov. Camarines Sur, Pasacao, 68.
This species is evidently distinct from *S. acida* Linn. f., to which it was referred by Fernandez-Villar. It may be the same as *S. obovata* Blume.

DUABANGA Hamilt.

D. moluccana Blume, Mus. Bot. Lugd. Bat. **1**: 109. 1849–51.
Luzon, Prov. Camarines Sur, Pasacao, 106, 158, and (?) 210; Mindanao, Prov. Zamboanga, 541, 615.
Tagalog, *Lubtab.*
Java and Borneo.

LEYTHIDACEÆ.

BARRINGTONIA Forst.

B. speciosa Forst. Char. Gen. 76. *t. 38.* 1776; Linn f. Suppl. 312.
Luzon, Prov. Camarines Sur, Pasacao, 3.
Malayan Archipelago, Islands of the Pacific, etc.

B. racemosa Blume, in DC. Prodr. **3**: 288. 1828.
Luzon, Manila, 708; Prov. Bataan, Mariveles, 775; Mindanao, Prov. Surigao, 319, small form.
Tagalog, *Putad* or *Putat.*
Southern Asia, Malayan Archipelago, and Polynesia.

RHIZOPHORACEÆ.

GYNOTROCHES Blume.

***G. axillaris** Blume, Bijdr. 219. 1825.
Mindanao, Prov. Surigao, 485; Island of Dinagat, 491.
On the seacoasts of the Malayan Archipelago.

CERIOPS Arns.

C. candolleana Arn. Ann. Nat. Hist. **1**: 364. 1838.
Luzon, Prov. Camarines Sur, Pasacao, 71. Mindanao, Prov. Surigao 486, 501.
Seacoasts of Tropical Africa and Asia to Australia.

RHIZOPHORA Linn.

R. mucronata Lam. Encycl. **6**: 169. 1804.
Luzon, Prov. Camarines Sur, Pasacao, 81, 140.
Seacoasts of tropical Africa and Asia to Australia.

BRUGUIERA Linn.

B. gymnorrhiza Lam. Illus. *t. 397*. 1791.
Mindanao, Prov. Surigao, 497; Island of Tinago, 430.
Coasts of tropical Africa, Southern Asia, to Australia, Polynesia, etc.

B. eriopetola Wight and Arn. Ann. Nat. Hist. **1**: 368. 1838.
Luzon, Prov. Camarines Sur, Pasacao, 70.
Coasts of tropical Asia, Malayan region, etc.

B. parviflora Wight and Arn. Prodr. 311. 1834.
Mindanao, Prov. Surigao, 484.
Distribution as the proceding species.

MYRTACEÆ.

PSIDIUM Linn.

P. guayava Linn. Sp. Pl. 470. 1753.
Luzon, Prov. Bataan, Mariveles, 778.
Introduced from America, and now common and widely distributed in the Philippines.

DECASPERMUM Forst.

D. paniculatum (Lindl.) Kurz, Journ. As. Soc. Beng. **46**: 61. 1877.
Mindanao, Prov. Surigao, 475; Island of Dinagat, 465.
Bengal, through the Malayan Archipelago to Australia.

JAMBOSA DC.

J. vulgaris DC. Prodr. **3**: 286. 1828. (*Eugenia jambos* Linn. Sp. Pl. 470. 1753.)
Luzon, Prov. Bataan, Mariveles, 751.
Widely distributed in the Tropics.

*** J. vriesiana** Miq. Fl. Ind. Bat. **1**: pt. 1, 428. 1855.
Mindanao, Prov. Surigao, 834.
Java.

J. lineata DC. Prodr. **3**: 287. 1828. (*Eugenia lineata* Duthie.)
Mindanao, Prov. Surigao, 429, 516; Prov. Zamboanga, 593.
Malayan Peninsula and Archipelago.

SYZYGIUM Gaertn.

S. carophyllaceum Gaertn. Fruct. **1**: 166. *t. 33.* 1788. (*Eugenia carophyllacea* Wight.)
Mindanao, Prov. Surigao, 424.
Ceylon to Malayan Archipelago.

S. jambolana (Lam.) DC. l. c. 259. (*Eugenia jambolana* Lam.)
Luzon, Manila, 714; Prov. Bataan, Mariveles, 779; Prov. Camarines Sur, Pasacao, 35.
Tagalog, *Lumboi* or *Dryad.*

There are several other numbers in the collection that represent species in this genus, and one or two undeterminable specimens of the genus *Jambosa.* The Philippine species have never been carefully determined in these difficult genera.

XANTHOSTEMON F. Muell.

X. verdugonianus Naves in F. Vill. Nov. App. 82. 1883; Fl. Filip .ed. 3, *t. 300;* Vidal, Sinopsis, Atlas, *t. 49. f. K.* 1883.
Island of Tinago, 428.
Visayan, *Mancono.*
Endemic.

COMBRETACEÆ.

TERMINALIA Linn.

T. catappa Linn. Mant. **2**: 519. 1767. (*T. latifolia* Blanco.)
Luzon, Prov. Camarines Sur, Pasacao, 52, 76.
Southern Asia to Australia and Polynesia.

T. edulis Blanco, Fl. Filip. ed. 2, 265. 1845.
Luzon, Prov. Camarines Sur, Pasacao, 1; Prov. Bataan, Balanga, 306.
Tagalog, *Calumpit.*
Endemic.

T. calamansanay (Blanco) Rolfe, Journ. Linn. Soc. Bot. **21**: 310. 1884. (*Gimbernatia calamansanay* Blanco, Fl. Filip. ed. 2, 266. 1845.)
Luzon, Prov. Bataan, Mariveles, 785. Mindanao, Prov. Surigao, 329.
Tagalog, *Calamansanay.*
Endemic.

T. sp. indet.
Luzon, 785.

QUISQUALIS Linn.

Q. indica Linn. Sp. Pl. ed. 2, 256. 1763.
Luzon, Prov. Camarines Sur, Pasacao, 179, 290.
Widely distributed in the Tropics.

LUMNITZERA Willd.

Lumnitzera purpurea (Gaud.) Presl. Repert. **1**: 155. 1834. (*Laguncularia purpurea* Gaud. 1826; *L. coccinea* Wight. and Arn. 1834.)
Island of Dinagat, 441.
Along the seacoasts of Malacca, Malaya Archipelago, to Australia, etc.

MELASTOMACEÆ.

MEMECYLON Linn.

M. spp. indet.
Four distinct species of this genus are represented in the collection, one or two of them being very characteristic and probably undescribed. None of the material, however, is in condition for accurate determination, being mostly in fruit, or one number with immature flowers. Nos. 515, 588, 656, 684, 800.

ASTRONIA Blume.

A cumingiana Vidal, Phanerog. Cuming. 174. 1885.
Mindanao, Prov. Surigao, 322.
Endemic.

A. macrophylla Blume, Bijdr. 1880. 1825.
Luzon, Prov. Albay, Legaspi, 841.
Borneo, Celebes, etc.

A. rolfei Vidal, l. c., 174.
Mindanao, Prov. Surigao, 517, 344.
Endemic.

ARALIACEÆ.

SCHEFFLERA Forst.

S sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 295. Material very fragmentary.

ARTHROPHYLLUM Blume.

A. diversifolium Blume, Bijdr. 879. 1825.
Luzon, Prov. Bataan, Mariveles, 753.
Malayan Peninsula and Archipelago.

MYRSINACEÆ.

MÆSA Forsk.

M. laxa Mez, in Engler, Pflanzenreich, **9**: 32. 1902. (*M. indica*, var. *obtusa* A. DC., and var. *wightiana* A. DC. in DC. Prodr. **8**: 80. 1844.
Luzon, Prov. Camarines Sur, Pasacao, 163. Mindanao, 812.
Endemic.

M. hænkeana Mez, l. c. 32.
Mindanao, Prov. Surigao, 341. Inflorescence longer than described by Mez.
Endemic.

M. spp. indet. 279, 219. The first number from Pasacao is evidently not described by Mez in his recent monograph of the *Myrsinaceæ*. The last is too imperfect to identify.

ÆGICERAS Gaertn.

A. corniculatum (Linn.) Blanco, Fl. Filip. ed. 1, 79. 1837. (*Rhizophora corniculata* Linn. Amoen. Acad. **4**: 123. 1760; *Umbraculum corniculatum* O. Kuntze, Rev. Gen. **2**: 405. 1891; *Ægiceras majus* Gærtn. Fruct. **1**: 216. *t. 46*. 1788.)
Mindanao, Prov. Surigao, 431, 498.
Seacoasts southern Asia to Australia.

A. floridum R. and S. Syst. **4**: 512. 1819.
Luzon, Prov. Camarines Sur, Pasacao, 118, 250, 284.
Seacoasts of Philippines, Amboina, and New Guinea.

ARDISIA Sw.

A. philippinensis A. DC. in DC. Prodr. **8**: 128. 1844.
Mindanao, Prov. Zamboanga, Tetuan, 534.
Endemic.

A. humilis Vahl. Symb. Bot. **3**: 40. 1794.
Luzon, Prov. Camarines Sur, Pasacao, 806, 242, and (?) 101; Mindanao, Prov. Surigao, 692, 462; Prov. Zamboanga, 572.
Southern Asia and the Malayan region.

A. perrottetiana A. DC. Ann. Soc. Nat. II. **14**: 95. 1841.
Mindanao, Prov. Surigao, 453, 670, 686.
Endemic.

A. spp. indet. 272, 596. No. 599 is a very distinct form of the subgenus *Pyrgus*, evidently undescribed by Mez.

RAPANEA Aubl. (*Myrsine* R. Br.)

R. philippinensis (A. DC.) Mez, in Engler's Pflanzenreich **9**: 364. 1902. (*Myrsine philippinensis* A. DC. in DC. Prodr. **8**: 94. 1844.)
Island of Dinagat, 444.
Endemic.

SAPOTACEÆ.

ILLIPE Kœnig.

I. BETIS (Blanco) (*Azaola betis* Blanco, Fl. Filip. ed. 1, 402. 1837; *Payena betis* F. Vill. Nov. App. 125. 1883.)
Luzon, Prov. Camarines Sur, Pasacao, 131, 241.
Tagalog, *Betis*.
Endemic.

I. sp. indet.
Mariveles, Prov. Bataan, Luzon, 762.

PALAQUIM Blanco.

P. latifolium Blanco, Fl. Filip. ed. 1, 404. 1837.
Luzon, Manila, 738.
Tagalog, *Palac-palac*.
Endemic.

PALAQUIUM AHERNIANUM Merrill, sp. nov. A tree with obovate, obtuse, or acute leaves which are densely rusty-tomentose beneath, rusty-tomentose flowers and ellipsoid one-seeded fruits. Young branches with numerous, rather prominent wart-like growths which bear the flowers. Leaves obovate, or sometimes nearly ovate, 12 to 20 cm. long, 6 to 9 cm. wide, the base acute, the apex obtuse or somewhat acute, glabrous above, densely rusty-tomentose beneath, the nerves, 15 pairs, prominent, especially beneath; petioles 2.5 cm. long, rusty-tomentose. Flowers numerous, single or fasciculate in twos or threes on wart-like growths on the stem below the leaves, the peduncles 2 cm. long, rusty-tomentose. Calyx lobes, 4 mm. long triangular, acute, rusty-tomentose. Petals unknown. Ovary rusty-tomentose. Fruit one-seeded, ellipsoid, 2.5 cm. in diameter.
Type specimen No. 842, Prov. of Zamboanga, Mindanao, also No. 608 Prov. of Zamboanga, Mindanao, June, 1901.

This species is related to *Palaquium lobbianum* Burck, from Ternate, but differs from that species in the different shape and nervation of its leaves, longer peduncles, and other characters.

* **P. celebicum** Burck, Ann. Jard. Bot. Buitenz. **5**: 32. 1886. Mindanao, Prov. of Cottabato 839. The specimen is without fruit or flowers, but is undoubtedly this species.
Celebes.

P. cuneatum Vidal, Sinopsis, Atlas, *t. 62. f. A.* 1883, not *Bassia cuneata* Blume. *Dichopsis cuneata* F. Vill. Nov. App. 124. 1883.
Luzon, Prov. Camarines Sur, Pasacao, 42.
Endemic.

P. sp. indet.
Mindanao, Prov. Cottabato, 837. A species related to *P. celebicum* but distinct. Material very imperfect.

PAYENA A. DC.

* **P. leerii** (Teysm. and Binn.) Benth. and Hook. f. Gen. Plant. **2**: 659; Burck, Ann. Jard. Bot. Buitenz. **5**: 56. *t. 8.* 1886.
Islands of Tawitawi, 838.
Sumatra and Borneo to Amboina.

P. sp. indet.
Island of Dinagat, 483.

MIMUSOPS Linn.

M. elengi Linn. Sp. Pl. 349. 1753.
Mindanao, Prov. Zamboanga, Tetuan, 567.
Southern Asia, etc.

EBENACEÆ.

MABA Forst.

M. buxifolia Pers. Syn. **2**: 606. 1807.
Luzon, Prov. Camarines Sur, Pasacao, 5 bis; Island of Dinagat, 448; Island of Tinago, 425.
Sp.-Filip. *Ebano.*
Tropical Asia, Malayan region, etc.

DIOSPYROS Dalech.

D. discolor Willd. Sp. Pl. **4**: 1108. 1804.
Luzon, Prov. Bataan, Mariveles, 770; Prov. Camarines Sur, Pasacao, 29, 169, 278; Mindanao, Prov. Surigao, 360.
Tagalog, *Camagon.*

D. philippinensis A. DC. in DC. Prodr. **8**: 231. 1844.
Luzon, Prov. Camarines Sur, Pasacao, 39, 112.
Endemic.

D. pilosanthera Blanco (?), Fl. Filip. ed. 1, 304. 1837.
Luzon, Prov. Camarines Sur, Pasacao, 790.
Endemic.

D. spp. indet.
Luzon 13, 261; Tinago, 427.

OLEACEÆ.

OLEA Linn.

O. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 44.
Specimen very imperfect.

MAYAPEA Aubl.

M. sp. indet. Seems near *M. ramiflora* (Roxb.) F. Muell.
Island of Dinagat, 449, 450.

LOGANIACEÆ.

STRYCHNOS Linn.

* **S. celebica** Koorders, Mededeel 's Lands Plant. **19**: 540, 631. 1898.
Mindanao, Prov. Zamboanga, Tetuan, 538.
A species previously known only from North Celebes.

COUTHOVIA A. Gray.

* **C. celebica** Koorders, l. c. 537, 538. 1898.
Mindanao, Prov. Surigao, 353.
Visayan, *Bali-bali.*
A species previously known only from North Celebes.

FAGRÆA Thunb.

F. morindæfolia Blume, Rumphia, **2**: *t. 73. f. 2, t. 79.* 1836.
Mindanao, Prov. Surigao, 303; Prov. Zamboanga, 586.
Malayan region.

APOCYNACEÆ.

LEPINIOPSIS Valeton.

* **L. ternatensis** Valeton, Ann. Jard. Bot. Buitenz. **12**: 252. *pl. 28.* 1895.
Mindanao, Prov. Surigao, 693.
That this species should be found in the Philippines is most interesting. This monotypic genus was based on a plant cultivated in the botanical garden at Buitzenborg, supposed to have come from the Island of Ternate, one of the Moluccas. At present, however, the Philippine locality is the only one definitely known for this species in a wild state. The Philippine specimen differs from the type material in Herb. Hort. Bot. Bog., only in its somewhat thicker fruits.

PLUMIERA Linn.

P. acutifolia Poir. in Lam. Encycl. Suppl. **2**: 667. 1817.
Luzon, Prov. Bataan, Mariveles, 782; Mindanao, Prov. Surigao, 663.
Tatalog, *Cachuchi.*
Introduced from America. Cultivated.

ALSTONIA R. Br.

A. macrophylla Wall. Cat. No. 1648. 1828.
Luzon, Prov. Camarines Sur, Pasacao, 75.
Malayan Peninsula.

Fig. 1.—THE CANARIUM AVENUE.

Fig. 2.—A PALM AVENUE.

PLATE V.

PLATE VI.

FIG. 1.—THE NEW CANARIUM AVENUE.

FIG. 2.—A VIEW IN THE PANDANUS SECTION.

A. scholaris (Linn.) R. Br. Mem. Wern. Soc. **1**: 75. 1809. (*Echites scholaris* Linn.)
Mindanao, Prov. Zamboanga, 606.
Tagalog, *Ditaa.*
Throughout the East Indies.

A. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 258.
An imperfect specimen, with much smaller leaves than the preceding species.

TABERNÆMONTANA Linn.

T. pandacaqui Poir. in Lam. Encycl. **7**: 529. 1806. (*T. laurifolia* Blanco, non Linn.)
Luzon, Manila, 717; Prov. Bataan, Mariveles, 772.
Tagalog, *Pandacaqui.*
Endemic.

T. sphærocarpa Blume, Bijdr. 1028. 1826. (*T. globosa* Naves.)
Luzon, Prov. Bataan, Mariveles, 774.
Tagalog, *Pandacal.*

T. sp. indet.
Mindanao, Prov. Surigao, 311; Island of Dinagat, 489.
Visayan, *Jandayagcot.*

VOACANGA Dup. Th.

V. cumingiana Rolfe (?) Journ. Linn. Soc. Bot. **21**: 313. 1883.
Mindanao, Prov. Surigao, 330.
Endemic.

RAUWOLFIA Linn.

R. amsoniaefolia A. DC. in DC. Prodr. **8**: 338. 1844.
Luzon, Prov. Camarines Sur, Pasacao, 100, 849.
Endemic.

CERBERA Linn.

C. odollam Gaertn. Fruct. **2**: 193. 1791.
Luzon, Prov. Camarines Sur, Pasacao, 34, 799; Island of Dinagat, 438.
Tagalog, *Bayac usa.*
Tropical Asia, Malayan region, etc., to Australia.

TRACHELOSPERMUM Linn.

T. sp. indet. Near *T. fragrans* Hook. f., from the Himalaya region.
Luzon, Prov. Camarines Sur, Pasacao, 300. Material in poor condition.

WRIGHTIA R. Br.

W. sp. nov.? An entirely glabrous form related to *W. coccinea* Sims. Specimen in fruit.
Luzon, Prov. Camarines Sur, Pasacao, 40.

ASCLEPIADACEÆ.

HOYA R. Br.

H. multiflora Blume (?) Bijdr. 1804. 1825.
Mindanao, Prov. Surigao, 495.
Material imperfect, but doubtless this species.
Malayan region.

CONVOLVULACEÆ.

IPOMŒA Linn.

I. peltata (Linn.) Choisy, Mem. Soc. Phys. Genev. **6**: 452. 1833. (*Convolvulus peltatus* Linn.)
Luzon, Prov. Camarines Sur, Pasacao, 226, 297.
Hallier places this species in the genus *Merremia*.
Malayan region.

I. denticulata (Desrouss.) Choisy, l. c. 447. (*Convolvulus denticulatus* Desrouss.)
Luzon, Prov. Camarines Sur, Pasacao, 298.
From the Seychelles to Australia and Polynesia.

I. pes-capræ (Linn.) Roth, Nov. Sp. Pl. 109. 1821. (*Convolvulus pes-capræ* Linn; *Ipomœa biloba* Forsk.)
Luzon, Prov. Camarines Sur, Pasacao, 299.
Near the seacoast in Tropics of both hemispheres.

BORRAGINACEÆ.

CORDIA Linn.

C. blancoi Vidal, Rev. Pl. Vasc. Filip. 192. 1886. (*C. dichotoma* Blanco, non Forst; *C. myxa* F. Vill., non Linn.; *C. sebestena* Naves, non allior.)
Luzon, Prov. Camarines Sur, Pasacao, 33, 791.
Endemic.

C. subcordata Lam. Ilustr. No. 1899.
Luzon, Prov. Camarines Sur, Pasacao, 84.
East Africa to Australia and Polynesia.

C. sp. indet.
Luzon, 783.

EHRETIA Linn.

E. buxifolia Roxb. Pl. Corom. **1**: 42. *t. 57.* 1795.
Luzon, Prov. Camarines Sur, Pasacao, 810. Mindanao, Prov. Zamboanga, 554, 621.
Southern Asia, Malayan region, etc.

E. philippinensis A. DC. in DC. Prodr. **9**: 504. 1845.
Luzon, Prov. Camarines Sur, Pasacao, 152.
Endemic.

TOURNEFORTIA Linn.

T. argentea Linn. f. Suppl, 133.
Luzon, Prov. Camarines Sur, Pasacao 221, 244.
Southern Asia, Malayan region to Australia, etc.

T. sarmentosa Lam. Illustr. **1**: 416. 1791.
Luzon, Prov. Camarines Sur, Pasacao, 256.
Philippines to Australia.

VERBENACEÆ.

GEUNSIA Linn.

G. farinosa Blume. Cat. Gew. Buitenz. 48. 1823; Bijdr. 819. 1825.
Mindanao, Prov. Zamboanga, Tetuan, 378.
Malayan region.

G. cumingiana (Schauer) Rolfe, Journ. Linn. Soc. Bot. **21**: 315. 1886. (*Callicarpa cumingiana* Schauer.)
Mindanao, Prov. Davao, Mt. Apo, 689; Luzon, Prov. Camarines Sur, Pasacao, (?) 803.
Endemic.

CALLICARPA Linn.

C. angusta Schauer, in DC. Prodr. **11**: 462. 1847.
Luzon, Prov. Camarines Sur, Pasacao, 198, 811. Mindanao, Prov. Zamboanga, 662.
Endemic.

C. cana Linn. Mant. **2**: 198. 1767.
Luzon, Prov. Camarines Sur, Pasacao, 156.
Southern Asia, Malayan region, to Australia.

* **C. arborea** Roxb. Hort. Beng. 10. 1814.
Mindanao, Prov. Surigao, 687. No. 540 represent a related form, but quite distinct.
Himalayan region to Sumatra and New Guinea.

TECTONA Linn.

T. grandis Linn. f. Suppl. 151.
Mindanao, Prov. Zamboanga, 602, 835; Jolo Archipelago, 844.
Southern Asia and Malayan region.

PREMNA Linn.

P. vestita Schauer, in DC. Prodr. **11**: 613. 1847.
Luzon, Prov. Bataan, Mariveles 748, 780; Manila, 718; Tarlac 705.
Tagalog, *Alagao*.
Endemic.

P. indet. Seems very near *P. lævigata* Miq., from Sumatra.
Luzon, Prov. Camarines Sur, Pasacao, 138, 801.

P. sp. indet.
Luzon, 103; Mindanao, 355.

GMELINA Linn.

G. villosa Roxb. Hort. Beng. 46. 1814.
Mindanao, Prov. Zamboanga, 618; Prov. Surigao, 331.
Southern Asia and the Malayan region.

VITEX Linn.

V. littoralis Decne, in Nouv. Ann. Mus. Paris. **3**: 401. 1834.
Luzon, Prov. Bataan, Mariveles, 752; Prov. Camarines Sur, Pasacao, 37, 826. Mindanao, Prov. Surigao, 389, 504; Prov. Zamboanga 400, 659. Island of Bongao, 845.
Tagalog, *Molave*.
Moluccas.

V. negundo Linn. Sp. Pl. 638. 1753.
Luzon, Prov. Camarines Sur. Pasacao, 166, 255, 223, 814. Mindanao, Prov. Surigao, 671.
Tagalog, *Lagundi*.
Southern Asia and Malayan region.

VITEX PHILIPPINENSIS Merrill, sp. nov.

A tree, nearly glabrous, with ample coriaceous 5-foliate leaves, and broadly foliate-winged petioles. Branches glabrous, striate. Petioles 12 to 15 cm. long, triangular in cross section, the foliate wings broadly ovate, cordate at the broadly rounded base and also at the apex, the entire breadth 13 cm. Leaves 5-foliate, petiolules 0.5 cm. long, leaflets lanceolate-ovate, glabrous, entire, tapering gradually to the cunuate base, and to the acute or slightly acuminate apex, 30 to 40 cm. long, 10 to 12 cm. wide, lateral veins about 12 pairs, prominent, anastomosing near the margin. Panicles terminal, glabrous, ample, but shorter than the leaves, 35 cm. long, the longer branches 20 cm. in length, opposite. Bracts lanceolate, acute, 1 cm. long, or less. Flowers numerous, crowded at the ends of the panicle branches, pedicles 2-3 mm. long. Calyx 3 mm. long, 5-toothed, the teeth acute, 1 mm. long. Corolla 6 to 8 mm. long, scurfy-tomentose.

Type specimen collected at Tagana-an, Province of Zamboanga, Mindanao, No. 387 March (?) 1901. Moro (?) *Buli-cahoy.*

A species readily distinguished by its exceedingly broad foliate petioles, ample 5-foliate leaves, the former being a most characteristic feature. The affinity of this species is with *Vitex pteropoda* Miq. Fl. Ind. Bat. Suppl. 567, from Sumatra, but it is certainly quite distinct from that species.

V. sp. indet.
Luzon, 110, 706.

CLERODENDRON Linn.

C. intermedium Cham. Linnaea, **7**: 150. 1832.
Mindanao, Prov. Surigao, 327.
Endemic.

* **C. lanuginosum** Blume, Bijdr. 810. 1825.
Mindanao, Prov. Surigao, 691.
A species previously known only from the Moluccas.

* **C. minahassæ** Teysm. and Binn. Tijd. Ned. Ind. **25**: 409. 1863.
Mindanao, Prov. Zamboanga, 568.
A species previously known only from Celebes.

C. sp. indet.
Mindanao, 549. Specimen incomplete.

AVICENNIA Linn.

A. officinalis Linn. Sp. Pl. 110. 1753.
Luzon, Prov. Camarines Sur, Pasacao, 116, 148.
From East Africa to Polynesia.

BIGNONIACEÆ.

DOLICHANDRONE Fenzl.

D. spathacea (Linn.) K. Schum. Fl. Kaiser Wilhelmsland. 123. 1889. (*Bignonia spathacea* Linn; *D. rheedii* Seem.)
Luzon, Manila 723 (?), Prov. Camarines Sur, Pasacao, 59. Mindanao, Prov. Surigao, 672.
Tagalog, *Tui.*
Malayan Peninsula and Archipelago, etc.

STEROSPERMUM.

S. pinnatum (Blanco) F. Vill. Nov. App. 151. 1883.
Luzon, Prov. Camarines Sur, Pasacao, 61. Mindanao, Prov. Surigao, 528, 848.
Endemic.

RUBIACEÆ.

WENDLANDIA Brtl.

W. paniculata DC. Prodr. **4**: 411. 1830. (*W. luzonensis* DC. l. c. 412.)
Mindanao, Prov. Zamboanga, Tetuan, 564.
From the Himalayan region, throughout the Malayan region.

ADINA Salisb.

A. philippinensis Vidal, Rev. Pl. Vasc. Filip. 148. 1886. (*A. polycephala* Vidal, Sinopsis, Atlas, *t. 56. f. B.*, non Benth.)
Luzon, Prov. Camarines Sur, Pasacao, 102.
Endemic.

MITRAGNE Korth.

M. sp. indet.
Luzon, Prov. Camarines Sur, Pasacao, 21.

NAUCLEA Linn.

N. Blancoi Vidal (?) Phanerog. Cuming. 175. 1885.
Luzon, Prov. Camarines Sur, Pasacao, 58, 808.
Tagalog, *Mambog*.
Endemic.

N. spp. indet.
Mindanao, 362, 374, 666.

SARCOCEPHALUS Afzel.

S. cordatus Miq. Fl. Ind. Bat. **2**: 133. 1855–1859.
Mindanao, Prov. Surigao, 335.
Tropical Asia to Australia.

MUSSÆNDA Linn.

M. grandiflora (Meyen) Rolfe, Journ. Linn. Soc. Bot. **21**: 311. 1884. (*Calycophyllum grandiflorum* Meyen; *M. frondosa* Blanco, non Linn.)
Luzon, Prov. Camarines Sur, Pasacao, 199, 802, 818.
Endemic.

M. anisophylla Vidal, Phanerog. Cuming. 178. 1885.
Mindanao, Prov. Surigao, 339.
Endemic.

UROPHYLLUM Wall.

* **U. glabrum** Jack. ex Roxb. Fl. Ind. ed Carey, **2**: 186.
Mindanao, Prov. Surigao, Placer, 317, 404.
Malayan Peninsula, Java, and Borneo.

RANDIA Houst.

R. cumingiana Vidal, Phanerog. Cuming. 179. 1885.
Luzon, Prov. Camarines Sur, Pasacao, 189.
Endemic.

R. sp. indet.
Luzon, 126, Mindanao, 457.

GARDENIA Ellis.

G. obscura (Blanco) Vidal, Phanerog. Cuming. 119. 1885. (*Remigia obscura* Blanco.)
Luzon, Manila, 720, 733.
Tagalog, *Malababas* or *Calagri*.
Endemic.

G. pseudopsidium Blanco, Fl. Filip. ed 1, 497. 1837.
Luzon, Manila, 744.
Endemic.

TRICALYSIA A. Rich.

T. sp. indet. (Sect. *Diplospora*.)
Luzon, Prov. Camarines Sur, Pasacao, 248. Seems very near to an unnamed specimen in Herb. Hort. Bot. Bog., collected in Minahassa, North Celebes, by Dr. Koorders. Specimen in fruit.

PLECTRONIA Linn.

P. horrida (Blume) Benth. and Hook. f. ex King in Journ. As. Soc. Beng. **44**: 153. 1877. (*Canthium horridum* Blume.)
Luzon, Prov. Camarines Sur, Pasacao, 254, 819.
Tagalog, *Dayap-dayap*.
Malayan Peninsula and Archipelago.

* **P. moluccana** (Roxb.) *Canthium moluccanum* Roxb. Hort, Beng. 85.
Mindanao, Prov. Surigao. 451.
Moluccas.

GUETTARDA Linn.

G. speciosa Linn. Sp. Pl. 991. 1753.
Luzon, Prov. Camarines Sur, Pasacao, 19, 205; Island of Dinagat, 464.
Extends from East Africa to Polynesia.

TIMONIUS Rumph.

TIMONIUS PHILIPPINENSIS Merrill, sp. nov.

A shrub (?) or tree with glabrous, terete, purplish ultimate branches, prominent leaf scars and ovate or ovate-oblong, rarely obovate, firm leaves. Petioles thick, glabrous, 3 to 8 mm. long; leaves entire, 10 to 15 cm. long, 5 to 6 cm. wide, acute, or very obscurely broadly-acuminate, tapering to the acute or rarely slightly obtuse base, shining and glabrous above except for few short scattered white hairs on the nerves, beneath with few scattered hairs on the nerves, and bearded in the axils with few or many usually brownish hairs, otherwise glabrous except for a very few scattered hairs on the reticulations. Nerves prominent, 5 or 6 pairs. Stipules deciduous, triangular, acuminate, 6 to 8 mm. long, sparingly appressed-hirsute and ciliate on the margins, leaving a ciliate ring above the leaf scar when fallen. Inflorescence axillary, cymose rather densely, 6 to 8 flowered; peduncles glabrous, 15 cm. long. Flowers sessile or nearly so. Calyx, purplish, glabrous, about 3 mm. long, truncate or obscurely and broadly 5-toothed. Corolla 1 cm. long, 5-lobed, densely appressed-villous throughout.

Island of Dinagat, 463, 456.

A species very closely related to **Timonius compressicaule** (Miq.) (*Polyphragmon compressicaule* Miq.), from Sumatra, but differing in its much thicker purplish, glabrous, terete, ultimate branches, glabrous calyx, and longer corolla.

IXORA Linn.

I. coccinea Linn. Sp. Pl. 110. 1753.
Mindanao, Prov. Zamboanga, 650.
Malayan Peninsula and Archipelago etc.

* **I. amboinica** DC. Prodr. **4**: 487. 1830.
Luzon, Prov. Camarines Sur, Pasacao, 820.
Amboina.

* **I. timorénsis** Decne. Nouv. Ann. Mus. Par. **3**: 418. 1834.
Luzon, Prov. Camarines Sur, Pasacao, 246.
Timor to Australia.

I. spp. indet. Several other distinct species are represented in the collection, but I am unable to identify them at present, 170, 233, 243, 423, 480, 807.

PSYCHOTRIA Linn.

P. malayana Jack. in Malay. Misc. **1**: 3. 1820.
Luzon, Prov. Camarines Sur, Pasacao, 196, a broad-leafed form. Mindanao, Prov. Surigao, 472.
Malayan Peninsula and Archipelago.

P. sp. indet.
Mindanao, 321.

MORINDA Linn.

M. bracteata Roxb. Hort. Beng. 15. 1814. (*M. ligulata* Blanco.)
Luzon, Manila, 731; Prov. Bataan, Mariveles, 766; Prov. Camarines Sur, Pasacao, 92. Mindanao, Prov. Surigao, 304, 411.
Southern Asia, Malayan region, etc.

M. citrifolia Linn. Sp. Pl. 176. 1753.
Luzon, Prov. Camarines Sur, Pasacao, 211. Mindanao, Prov. Surigao, 679.
Tagalog, *Nino* or *Tumbon aso*.
Southern Asia to Australia.

M. tinctoria Roxb. ? Hort. Beng. 15. 1814.
Mindanao, Prov. Surigao, 384.
Southern Asia and the Malayan region.

GOODENIACEÆ.

SCÆVOLA Linn.

S. kœnigii Vahl. Symb. **3**: 36. 1794. (*S. lobelia* Blanco, non Linn.)
Luzon, Prov. Camarines Sur, Pasacao, 229.
A common plant along the seacoasts in the Tropics of the Old World.

COMPOSITÆ.

MICROGLOSSA DC.

M. volubilis DC. Prodr. **5**: 320. 1836.
Mindanao, Prov. Davao, 851.
Tropical Asia, the Malayan region, etc.

III. METHOD OF WORK ON THE FOREST FLORA OF JAVA.

The following report on Dr. Koorders's method of studying the forest flora of Java is the first note regarding his successful methods that has been published in the English language. The manuscript of the present article was carefully examined by Dr. Koorders before I left Buitenzorg. Dr. Koorders has published several articles on his method of work in "Teysmannia," a periodical published in Batavia, but as his articles are in the Dutch language, and this periodical is accessible to but few American forestry students, it is hoped that the present article will prove of importance to those Americans who are interested in the subject of forestry, and especially to the workers on the problems presented by Philippine forestry conditions, which in many respects resemble the conditions in Java.

Manifestly, the method of conducting forest flora investigations outlined below has little or no bearing on the forestry conditions in a temperate country like the United States, where extensive areas exist practically entirely occupied by a single species and where the individual tree species are few in number. But in a tropical country like the Philippines, where there are to be found no large areas occupied exclusively by a single species and where the number of tree species is very largely developed, it is evident that some special method of conducting the forest flora investigations must be adopted. The forester and lumberman must each take into consideration all the trees in the area in which he is working, whether or not they are of economic importance. It is of the utmost importance also that accurate information be compiled to enable us to prepare correct guides for the identification of the more important trees in the Archipelago.

While it may prove impossible to apply Dr. Koorders's method as a whole to Philippine conditions, yet certain features at least can be advantageously applied here.

After receiving his appointment in the year 1888 to conduct investigations on the forest flora of Java, Dr. Koorders spent several years traveling in all parts of the island, selecting and studying the type vegetative areas, and collecting data and botanical material for working up the forest flora of the island. Since 1888 the numbered botanical collection of the herbarium of the Java Forestry Bureau, or the Herbarium Koordersianum, has reached a total of about forty thousand numbers,

and on this material is based the published results of these careful investigations, entitled "Bijdragen tot de kennis der Boomsoorten van Java," by Drs. Koorders and Valeton. These "Bijdragen" are issued in the Garden publication entitled "Mededeelingen uit's Lands Plantentuin," the first of these works on the forest flora of Java being published in 1896. Since that date seven numbers of the "Bijdragen" have been issued, of from two hundred to four hundred and seventy pages each, and at present two or three additional volumes are in the hands of the printer. In these "Bijdragen" the forest flora of Java is treated by families, with analytical keys to the genera. They contain careful generic and specific descriptions in both Latin and Dutch, with rather full citations and synonymy, followed by a long discussion of each species in the Dutch language, giving the detailed geographical distribution; the abundance or scarcity of the species in Java; its general distribution outside of Java; habitat; peculiarities of the plant; time of flowering and fruiting; time of falling of the leaves, if a deciduous tree; local names; economic uses, etc. These "Bijdragen" constitute one of the most careful and complete publications in any language on the forest flora of a tropical country, and much of the data on which this most excellent publication was based could have been secured in no other way than by the careful preliminary work on the type vegetative areas carried out by Dr. Koorders.

After a preliminary survey of the field, Dr. Koorders found it quite impossible for any one man to make a complete study of all the forest regions of the Island, and accordingly, after much study on the subject, he worked out in detail the plan outlined below.

The principle of the scheme adopted was to select certain areas representing vegetative conditions in the various parts of the Island, typical both from a systematic and ecological standpoint; to number carefully the different species found in each one of the type areas, and to prepare full notes on each species, giving size, native names, economic uses, its distribution within the selected area, whether common or rare, epiphytic or parasytic, the character of the soil, etc., together with complete botanical specimens. When the flora of several of these type areas had been determined by Dr. Koorders, a hurried botanical survey was made in the country between two or more of the selected areas, to test whether or not the selected areas represented the typical forest flora of the region. It is needless to state that these areas were selected with great care, localities being chosen sometimes because they represented a particular type of forest, young jungle, old jungle, open lands with scattered forest vegetation, swamp forests, "djati" (teak) forests, etc., and sometimes because of certain geographical features.

In the many "test" botanical surveys that have been made in the country between these selected type areas, the wisdom of the original se-

lection has in all cases been amply proved, because it has been found that the selected areas contained representatives of practically all the tree species that are found in Java. Occasionally, however, there will be found outside the type areas a rare species or one of very local distribution that is not to be found in any of the selected type areas. In another manner the value of this method of studying the forest flora is shown, for by the careful study of these type areas many tree species have been added to the Java flora that were previously unknown to the Island, and in some cases these species new to the flora are found to be of wide distribution there.

Since 1888 some twenty-seven of these type areas have been selected and carefully studied, many of them, especially those of the plain region, containing several square miles each; others, especially those on the high mountains, being of comparatively small size. They are not reserved from timber or agricultural exploitation, and occasionally it has happened that where type areas were thickly forested eight or ten years ago, now all of the original vegetation has been removed, and plantations of coffee, tea, or tobacco are found. It is not necessary to continue these extensive observations for a long period of years on all these type areas, and accordingly, after five, six or eight years, as the case may be, when all the information available or desired has been secured, the labels on the trees are removed and the area is abandoned.

To establish a basis for these investigations, Dr. Koorders divided Java into three geographical divisions, East Java, Middle Java, and West Java, each region characterized by extensive areas of country at a comparatively low elevation above the sea and each containing high mountains approximating 4,000 meters in altitude. Again, he arbitrarily divided the Island into four altitudinal regions or sections, thus making in all twelve botanical regions in the whole Island. The first of these altitudinal sections extends from the sea level to a height of 1,000 meters; the second from 1,000 to 2,000 meters; the third from 2,000 to 3,000 meters, and the fourth above 3,000 meters. In each of these altitudinal sections in East, Middle, and West Java type areas were selected. In the first altitudinal section—that is, from the sea level up to 1,000 meters—is of course to be found not only the greatest superficial area but also the greatest number of tree species, and acordingly in the first section, in East, Middle, and West Java, were selected three or four type areas; in the second altitudinal section two or three type areas; in the third one or two type areas, and in the fourth but one small plot near the summit of some one of the higher mountains in each of the three geographical regions.

In the Island of Java there are about 1,400 tree species known, and of these 1,400 species probably 1,200 attain a diameter of 12 centimeters or more. As noted above, the preponderance of tree species is found at the

lower altitudes—that is, up to 1,000 meters above the sea. In this first altitudinal section there are found in the neighborhood of 900 distinct tree species; in the second there is a very perceptible decrease in the number of individual tree species; in the third this decrease becomes very strongly marked; and in the fourth or alpine region but fifteen or twenty tree species are found, and these much stunted in growth.

When a type area is selected for study, a bivouac is established and a careful preliminary survey is made. After a thorough examination of the proposed area, the work of numbering the trees is commenced, and as each tree is numbered a printed slip or field label, with blank spaces, is filled out and afterwards filed with the botanical specimen, giving all the information obtainable regarding the tree, its name, economic uses, character of the bark, wood, etc. Any peculiarities regarding habit, foliage, flowers, or fruit, and the height and diameter are, whenever possible, carefully measured. Careful, and if possible complete, botanical specimens are prepared at the same time, bearing the distinctive number and plot letter of the tree, and these botanical specimens, together with the notes, are carefully preserved in the museum for further study. At the time the trees are numbered a sketch map is also made showing the position of the bivouac, the inspection paths, and the position of each numbered tree with its distinctive number and letter, and further, a careful catalogue is compiled, giving, first, the distinctive number and letter of each species; second, the native and Latin names, if known; third, the height of the tree in meters; fourth, its diameter in centimeters, measured at a height of 1.33 meters above the ground; and, fifth, a description of the exact locality of each labeled tree.

FORM OF REGISTER FOR A TYPE AREA.

Register of the trees and other plants which have been labeled for the forest flora investigations in the type vegetation area, _____. Island of _____, Province of _____, town of _____.

Plot No. 1.—Altitude 1 to 300 meters.

[Name of any distinctive geographical feature—mountain, valley, river, lake, etc.]

Tree No.	Plot letter.	Name of the plant.	Height in meters.	Diam. in cm.	Description of the exact locality of each numbered plant.
200	f	Putad (*Barringtonia racemosa.*)	5	10	Directly back of the bivouac; solitary on bank of rivulet.
200	f	Molave (*Vitex littoralis.*)	10	20	Six meters south of No. 2001 f.

Field label used by Dr. Koorders when making general collections outside of the type vegetative areas, and from unnumbered specimens in the type areas.

[Translation, E. D. M.]

Native plants of Java.
Residency, Batavia; Division, Buitenzorg.

Museum number: Herb KDS	β
Field number:	1177*
Date of collection:	
Locality:	
Native name:	
Latin name:	Det.
Collected by Koorders's collector Tirtoatmodjo.	
Altitude above the sea:	Meters.
Habitat, kind of soil:	
Tree; shrub; bush; vine; herb.	
Total height:	M.
Diameter, breast high:	Cm.
Deciduous, evergreen.	
Time of flowering:	
Flower. color, odor, etc.:	
Time of fruiting:	
Kind of fruit, color, etc.:	
Uses:	
Habit like:	
At this place	common rare.

REVERSE.

Trunk:

Crown:

Bark:

Sapwood:

Heartwood:

Mature leaves:

Field label used by Dr. Koorders when securing material and data from the type vegetative areas.

[Translation, E. D. M.]

NATIVE NAME_____Jav. Mad. Sund.

Lat. name_____

HEIGHT: (To the top. in meters)_____measured; estimated.

DIAMETER: (Breast high, in centimeters) _____ measured; estimated.

TRUNK:
1. Straight or columnar; slightly bent; much bent.
2. _____ cylindrical _____ flattened _____ angular _____ twisted.
3. Knurls (with _____ without); channels (with _____ without); thorns (with _____ without).
4. Buttresses (with _____ without); aerial roots (with _____ without).
5. First branches ± _____ meters from the ground.

CROWN:
1. ½, ⅓, ¼, etc _____ of the total height.
2. Irregular; spherical; semispherical; egg-shaped; cone shaped; flat; broad; small.
3. _____ thin; medium; _____ thick.

BRANCHES:
1. (The largest branches.) Usually ascending; horizontal; pendant.
2. (The largest branches.) _____ straight; _____ crooked; wide-spreading.
3. Ultimate twigs_____

BARK:
1. Thickness in mm _____ measured; estimated.
2. _____ tough _____ brittle _____ hard.
3. (Color.) Outside bark_____ Middle bark _____ Inner bark_____
4. _____ smooth; usually _____ rough; not; little; very scaly.
5. Bast; with _____ vertical _____ horizontal _____ without.
6. Lenticels; with _____ without.
7. Milky sap; with _____ without; with resin, gum, etc.
8. Chlorophyll; with _____ much; little; without.
9. Odor; with _____ without.
10. Taste; with _____ without.

FLOWER BUDS: 1. Color, outside_____

FLOWERS:
1. Color of whole inflorescence_____
2. Odor_____
3. Taste_____
4. Color of the flower parts:
   Calyx_____
   Corolla_____
   Stamens: filaments _____ anthers _____
   Pistil: Stigma_____ Style _____ Ovary _____

REVERSE.

YOUNG FRUIT:
1. Color: outside_____
2. Odor: (crushed) with _____ without.
3. Taste: with _____ without.

RIPE FRUIT:
1. Dry or fleshy; dehiscent or indehiscent.
2. Pericarp. Color_____ exocarp____ mesocarp_____ endocarp.
3. Pericarp. Odor: (crushed) with _____ without.
4. Pericarp. Taste: with _____ without.

SEEDS (ripe):
1. Color of the testa_____ endosperm.
2. Odor of endosperm_____ without.
3. Taste of endosperm_____ without.

YOUNG LEAVES:
1. Color: above_____ green; beneath_____ green.
2. _____ shining _____ dull.
3. Odor: (crushed); with _____; without.
4. Taste: with _____; without.

OLD LEAVES:
1. Color: above _____ green; beneath_____ green.
2. _____ shining _____ dull.
3. Odor: (crushed); with_____; without.
4. Taste: with_____; without.

HABIT: Resembles_____ (compared with some well-known species.)

USES: Wood; bark; sap; etc_____

SAPWOOD:

HEARTWOOD:

ROOTS:

In labeling the trees some precautions must be observed. Zinc labels, which would for most purposes be the best, are quite out of the question, as this, like all other metals, is greatly prized by the natives, and if it were used, the greater number of the labels would soon be destroyed by them. Accordingly, pieces of board, about 30 cm. square, are used. They are painted white, with the number and letter of the tree in black. A label of fair size is essential in order that it may be readily detected when one is searching for the tree the second time. These labels are nailed firmly to the trees with heavy spikes, for if smaller nails were used, being easily extracted, they would prove too attractive to the natives. Even when the large spikes are used the natives sometimes succeed in extracting them. However, as the tree is carefully located, both in the catalogue of the area and on the sketch map, little trouble is experienced in finding it the second time, even if the label has been removed. As a safeguard, however, a tree, as a rule, receives two distinct labels; one large and prominent, the other more inconspicuous.

With as many as twenty-seven type areas from which extensive botanical collections have been made, it is at once evident that some special method of labeling not only the trees but also the herbarium specimens and notes must be adopted in order to avoid confusion. Dr. Koorders has adopted the plan of combining a letter and a number, each altitudinal section having reserved for it alone a sequence of numbers between certain limits, and each type area in that section having a distinctive letter. Such a combination of letter and number shows at once not only the altitudinal and geographical section in which a plant was collected, but also the type area and the number of the tree in that area, and no other specimen in all the other twenty-six type areas has this same combination. To illustrate this point it is well to go into detail regarding this system of recording. As noted above, the great preponderance of tree species is found in the first altitudinal section, that is, below 1,000 meters. Accordingly there are reserved for the selected type areas in this section the numbers from 1 to 3000, and these numbers are used in the first altitudinal section in all the geographical regions, but each geographical region has a distinctive series of letters.

Any number between the limits of 1 and 3000 shows at once that the specimen was collected from a numbered tree in the first altitudinal section, and the letter used in combination with the number cited shows the exact type area and the geographical region in which the area is situated. It is, of course, not possible to find 3,000 different species in any one type area, but this large number is reserved because it is often necessary to label several specimens of the same species; ♂ and ♀ plants of the same species; old and young trees of the same species, etc. Possibly three or four, or even five or six, type areas may be reserved in the first altitudinal section

FIG. 1.—A VIEW IN THE PALM SECTION.

FIG. 2.—METHOD OF LABELING SECTIONS, AND THICKNESS OF PLANTING.

PLATE VII.

PLATE VIII.

FIG. 1.—THE RIVER IN THE GARDEN.

FIG. 2.—THE RIVER IN THE GARDEN.

in the geographical region of East Java, the same number in the corresponding altitudinal section in Middle and also in West Java. For the geographical region of East Java the letters *a, b, c, d, e, f* are reserved; for the geographical region of Middle Java the letters *g, h, i, j, k, l* are reserved, and for the geographical region of West Java the letters *m, n, p, t, r, s, w* are reserved.

In East Java the first type area established in the first altitudinal section receives the letter *a*, and the first plant numbered in that section receives the number 1 in combination with the letter—that is, 1 *a*; the second plant numbered is 2 *a*; the third 3 *a*, and so on up to 3000, if necessary or desirable. The second plot in the same altitudinal section and geographical region may be established 100 miles away from the first, and this receives the distinctive letter *b*; the first numbered tree in that section is 1 *b*, the second 2 *b*, and so on. In the second altitudinal section there is a great decrease in the number of tree species, and for this section are reserved the numbers from 3001 to 5000, used in combination with the same letters *a, b, c, d, e, f* for East Java, as in the first altitudinal section, these six letters being the distinctive letters for the geographical region of East Java. As in the first altitudinal section, the first type area established receives the distinctive letter *a*, but the first tree that receives a number in that type area is numbered 3001 *a*; the second 3002 *a*, etc. The third altitudinal section is marked by a very sharp decrease in the number of tree species, and for this section—that is, between 2,000 and 3,000 meters in altitude—it is only necessary to reserve 500 numbers, the letters *a, b, c*, etc., being applied to the type areas established but the sequence of numbers employed being between the limits of 5001 and 5500. The fourth altitudinal section, or the alpine region, is confined to the high mountain tops above 3,000 meters in altitude. The area of this high region is very limited, as is also the number of tree species, but fifteen or so being found. For this region only the numbers between 5501 and 5550 are reserved.

In Middle Java and in West Java, the other two geographical regions, the same sequence of numbers is used for the different altitudinal sections as in East Java, but Middle Java and West Java have distinctive series of letters as previously noted.

To further illustrate this scheme it may be well to cite and explain a few of the combinations. For instance, 1500 *b* shows that the specimen in question was collected between the sea level and an altitude of 1,000 meters in type area *b*, in the geographical region of East Java, and that further details regarding the specimen will be found in the register of type area *b* and in the notes under that number. No. 3601 *l* shows at once that the specimen in question was collected at an altitude of between 1,000 and 2,000 meters in the geographical region of Middle

Java, in type area *l*. No. 5015 *p* shows that the specimen was collected at an altitude of between 1,000 and 2,000 meters in the geographical region of West Java in type area *p*. It is needless to state that these type areas are most carefully localized geographically so that the citation of the number and letter shows at once the exact geographical locality.

For each of the twenty-seven type areas that have been studied in Java a separate catalogue has been prepared. Each catalogue contains a sketch map of the type area, a short description of the reserved plot, its exact geographical location, exact altitudes of the more prominent geographical features in the area, the numbers and data regarding all the trees recorded, etc. When the trees are originally numbered it very often happens that a specimen may have neither flower nor fruit, one or both of which are generally essential for purposes of accurate identification, and hence it is often necessary to visit the type area again in three or six months to secure the necessary herbarium material. A competent native collector can be used for this purpose, and the original collection or "controlling material" that was secured when the tree in question was numbered is an exact check on the accuracy of the second collection.

In collecting botanical material at the time the trees in one of the type areas are being numbered, it often happens that it is desirable to prepare botanical specimens of a certain species, and at the same time it is not advisable to number the specimen in question, especially with small shrubs, herbaceous plants, grasses, etc. In this case the specimen receives a field number, but of a sequence not reserved for any of the type areas, and the number of such a specimen is always followed by an asterisk, which shows at once that the herbarium specimen in question was not secured from a numbered tree.

With large and separately numbered collections from each of the twenty-seven type areas that have been studied in Java, not to mention the great amount of botanical material that has been collected outside of the type areas, it is very evident that some special method of recording must be devised. At Buitenzorg, when a collection is brought in from the field, the field number is reserved on the original specimen and entered in a special column in the museum catalogue. At the same time each specimen receives a new number and letter, the permanent herbarium or museum number which is written on the label with red ink and which is entirely independent of the field number. This permanent or herbarium number is the one under which the specimen is permanently entered in the herbarium catalogue, is the only number ever referred to in publications, and is the only number used in the distribution of duplicates, etc.

SAMPLE PAGE.

Catalogue of the herbarium.

Museum. No.	Latin name.	Family.	Collection No.	Local name.	Not only in herbarium but also—
15401 β	Lagerstrœmia speciosa Pers.	Lyth.	432 *e*	Woengel	A.
15402 β	Pemphis acidula Forst	Lyth.	1050 β	Sentigi	
15403 β	Barringtonia racemosa Bl.	Myrt.	250 *l*	Putad	
15404 β	Tectona grandis L.	Verb.	16 *a*	Djati	W.

In this catalogue the first column contains the permanent herbarium number, in combination with the Greek letter Beta, which is the initial letter of the old Javanese name of Buitenzorg, i. e., Bogor. The second column contains the Latin name of the plant; the third its family, generally abbreviated; the fourth, the field number of the plant; the fifth its local name; while the sixth is reserved to note whether or not material other than dry herbarium specimens was preserved; A.=alcoholic material; B.=bark; W.=wood, etc.

At the end of one or two, or at most three years after a type area has been selected and the trees numbered, it is revisited and careful notes are made of the changes that have taken place in the time elapsed. A second set of botanical specimens is also prepared at this time. The type areas are visited as often and as many times as may be necessary to secure the information available or desired.

This careful method of working out the forest flora under tropical conditions not only furnishes the most accurate information concerning the geographical distribution and scarcity or abundance of the many individual species but makes possible a most careful check on the accuracy and value of the many native names, and on the economic uses of the different species. Often it is found that "floating" names exist—that is, the same name is affixed to several different species, or to groups of related species—and on the other hand, names applied to certain species, especially to those of economic importance, will be found to be quite invariably applied to the same species. By preparing such a series of careful notes on the many species, and by checking over the local names each time a type area is visited, one can soon readily determine which of the native names are trustworthy and which are doubtful and should be discarded.

In the Philippine Archipelago, extending as it does over about fifteen degrees of latitude, there are probably 1,500 distinct species that would be classed in the forest flora; and of these 1,500 species some 75 or 80 per cent attain a diameter of ten or more centimeters. With this exceedingly large number of individual species, in order to obtain any definite knowledge of the component species of the Philippines forest flora, the extent of the forest areas, prevalence of valuable economic species, etc., it is quite

necessary to adopt some definite plan of investigation. To me the plan outlined above appears to be the most practicable one, and the one that will be productive of the best results.

As Java was divided by Dr. Koorders into three geographical regions from east to west, so, at his suggestion, the Philippine Archipelago can be divided into preferably three geographical regions, from north to south. In this preliminary report I would recommend that the Archipelago be divided into the following regions for the study of the forest flora: First, the northern or Luzon region, to consist of the Islands of Luzon, Mindoro, and Marinduque, with their outlying smaller islands; second, the central or Samar-Paragua region, to consist of the Islands of Samar, Leyte, Masbate, Bohol, Cebu, Negros, Guimaras, Panay, Calamianes, Paragua, etc.; third, the southern or Mindanao region, to consist of the Island of Mindanao, the Sulu Archipelago, and the outlying smaller islands.

As in the Philippines we have no mountains equalling those of Java in altitude, it will be more convenient to distinguish but three altitudinal sections rather than four, as in the investigations in Java. First, from the sea level to 1,000 meters in altitude; second, from 1,000 to 2,000 meters in altitude; and third, all mountain tops above 2,000 meters.

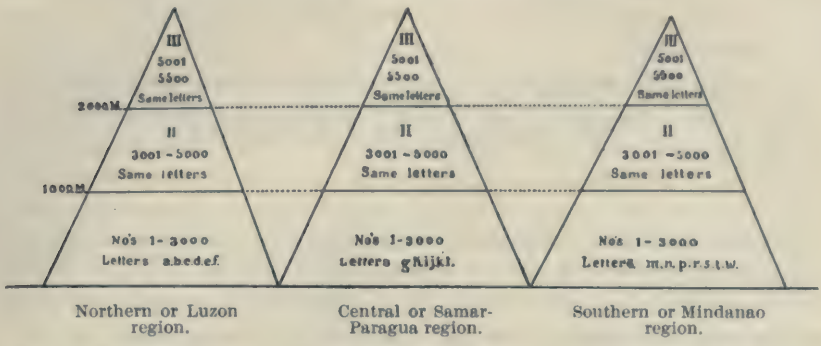
For the Luzon region the letters *a, b, c, d, e, f* can be reserved; for the Samar-Paragua region the letters *g, h, i, j, k, l,* and for the Mindanao region the letters *m, n, p, r, s, t, w.*

For the first altitudinal section the sequence of numbers between 1 and 3000 can be reserved; for the second altitudinal region the numbers between 3001 and 5000, and for the third region, or all altitudes above 2,000 meters, the numbers from 5001 to 5500.

Proposed botanical regions for the purpose of studying the forest flora of the Philippine Archipelago.

Altitudinal section.	Numbers.	Letters.
NORTHERN OR LUZON REGION.		
I. Sea level to 1,000 meters	1–3000	*a, b, c, d, e, f.*
II. 1,000 meters to 2,000 meters	3001–5000	
III. 2,000 meters +	5001–5500	
CENTRAL OR SAMAR-PARAGUA REGION.		
I. Sea level to 1,000 meters	1–3000	*g, h, i, j, k, l.*
II. 1,000 meters to 2,000 meters	3001–5000	
III. 2,000 meters +	5001–5500	
SOUTHERN OR MINDANAO REGION.		
I. Sea level to 1,000 meters	1–3000	*m, n, p, r, s, t, w.*
II. 1,000 meters to 2,000 meters	3001–5000	
III. 2,000 meters +	5001–5500	

Sketch showing the proposed geographical regions and altitudinal sections for the study of the forest flora of the Philippine Archipelago.



Northern or Luzon region. Central or Samar-Paragua region. Southern or Mindanao region.

In applying this plan of work to the Philippine conditions, it is only necessary to use the combination of the type area letter and the tree number, as illustrated above in the detailed report on Dr. Koorders's method of work in Java. This method of studying tropical forests is, I believe, the most practicable, productive of the best results both from an economic and a scientific standpoint, and in the long run probably the most economical which can be adopted in the Philippines. It has been found entirely satisfactory after fourteen years of application in the Island of Java, where the forest conditions are very similar to those of the Philippines.

In closing, I strongly urge that this system be given a thorough trial in the Philippines, by establishing several of these type areas in the near future. Preferably, the first type area should be near the city of Manila, in such a location that it can be easily reached from the city, and for this first type area I believe no better location can be selected than Mariveles, in the Province of Bataan, as here a type area can be readily established, extending from the sea level to an altitude of about 1,000 meters. A type area so established will not only serve to give use accurate information concerning the forest flora of the vicinity of Mariveles, which is typical of the whole Province of Bataan, but, in the absence of a proper botanical garden, will be of the greatest value in assisting employees of the Forestry Bureau to become acquainted with the forest conditions in the Philippines, the characteristics of the more valuable timber trees, etc., and to identify these species in the forest.

IV. THE BOTANICAL INSTITUTE ('S LANDS PLANTENTUIN) AT BUITENZORG.

Several extensive publications describing this admirable institution have recently appeared, and it is accordingly not my object to go into detail regarding it in the present paper, but only to record some of the methods of investigation and call attention to the equipment of the 's Lands Plantentuin.

The botanical garden at Buitenzorg forms a great park surrounding the residence of the governor-general of the Dutch East Indies. It was established in 1817 by Reinwardt, who was afterwards a professor at Leiden University. Following Reinwardt, Dr. C. L. Blume, as the first regularly appointed director, had charge of the gardens. In 1830 James Hooper, who came from the Royal Gardens at Kew, England, returned to Europe, and Mr. J. E. Teysmann was appointed his successor. To him are largely due the present beauty and utility of the botanical garden. It was Teysmann who, at Hasskarl's suggestion, adopted the plan of arrangement after the natural order of plants, so that, owing to this most convenient arrangement, it is now comparatively easy for one to study and compare the species of any one natural order, although there are now in cultivation over 10,000 species, covering an area of 147 acres.

When Teysmann resigned in 1859 Binnendyk was appointed to succeed him, and in the meantime the whole institution was reorganized on a plan drawn up long before by Teysmann.

In 1868 Dr. Scheffer, a man well qualified for the position, was appointed director. In 1875 he established the publication of the "Annales du Jardin Botanique de Buitenzorg." Above all other things in value, however, is the experimental garden established by Scheffer in 1876—a garden of 180 acres for experimenting on a large scale with economic species. Dr. Scheffer died in 1880, and Dr. Treub, the present director, was appointed his successor.

The present magnificent equipment and wide influence of the 's Lands Plantentuin is due largely to the well-directed efforts of Dr. Treub, a gentleman who is by education and inclination most admirably fitted for directing such an institution. At the time of his appointment in 1880 the institution practically corresponded to what is now the fifth division; for at that date that most practical adjunct, the experimental garden, had been established but four years. Since the year 1880 the institution has

extended its field from almost pure botanical work, to investigations which at the present time cover all lines of tropical botany and agriculture. Thorough work is the watchword; and the success of the many investigations carried out at Buitenzorg have had great influence not only on the agricultural development of the Dutch East Indies, but throughout the tropics. The success of the investigations made at this institution is recognized by the Dutch Government, as is shown by the large appropriations made for its maintenance and for special investigations, construction of new buildings, etc. It is also interesting to note here the interest that the Dutch planters take in the institution; for the entire expense of certain investigations is borne not by the Government but by an association of planters.

At the time of Dr. Treub's appointment as director in 1880 but two series of publications were issued; to-day there are six. In 1890 there were but four laboratories; to-day there are eight, each with most modern equipment. The working staff of the institution at present numbers about thirty Europeans and more than two hundred natives.

The institution known as "'s Lands Plantentuin" consists of the following divisions:

I. Herbarium and museum.
II. Botanical laboratories.
III. Agricultural and experimental gardens (181 acres), with laboratory for agricultural chemistry.
IV. Pharmacological laboratory.
V. Botanical Garden (145 acres) and the Mountain Garden (77 acres, and 700 acres virgin forest), with laboratory.
VI. Office, library, and photographic laboratory.
VII. Forest flora collections.
VIII. Laboratory for the study of Deli tobacco.
IX. Experimental station for coffee.
X. Laboratory for agricultural zoology.

Each of these divisions has commodious and well-equipped buildings and laboratories. The second division has a special laboratory reserved for foreign scientists, where many avail themselves of this excellent opportunity for studying tropical botany.

The Botanical Garden, from a climatic standpoint, is admirably situated, for under tropical conditions it is necessary, in order to have a successful garden, to have it situated in a locality where the rainfall is distributed throughout the year instead of having the two well-marked seasons—wet and dry. At Buitenzorg this condition is fulfilled, for during the so-called dry season rains are frequent, while during the rainy season one can expect rain every day—always in the afternoon at about 4 or 5 o'clock. The average precipitation in a year is about 4,680 mm., while sometimes as much as 160 mm. will fall in twenty-four hours, as happened once or twice during my stay at Buitenzorg.

The experimental garden consists of 180 acres, and is situated about two miles from the Botanical Garden proper. The object of this garden is to grow species of economic importance on a large scale; to supply material for investigations made in the various laboratories; to experiment with various methods of cultivation, treatment, etc. Practically all the tropical plants of great economic importance are found here, each species being represented by a large number of specimens. The species cultivated include many varieties of coffee, tea, and cacao; abacá and other fiber plants; pepper, nutmegs, cloves, and other spices; erythroxylon, cinchona, and other plants producing alkaloids; palms of economic importance; grasses yielding essential oils; numerous varieties of gutta-percha, caoutchouc, and other gum-producing trees; plants producing dyes, tannin, camphor, etc. Also connected with this garden is a large area of paddy land for experimenting in rice culture.

APPROPRIATIONS.

For the support of the institution at Buitenzorg annual appropriations are made by the Government. Several appropriations for one year (1897) are as follows:

		Guilders.*
Director		14,400
Division I.		
Herbarium and museum:		
Chief (botanist)	9,600	
Curator	2,400	
		12,000
Division II.		
Botanical laboratory:		
Chief	7,800	
Botanist for tobacco	6,000	
Expenses	700	
		14,500
Division III.		
Experimental garden and laboratory for agricultural chemistry:		
Chief	7,800	
Assistant chemist	4,200	
Assistant chemist for tea	3,600	
Special fund	600	
Gardener	1,800	
Labor	6,000	
		24,000
Division IV.		
Pharmacological laboratory:		
Chief	7,200	
Expenses	1,000	
		8,200

* One guilder = $0.40 United States currency.

Division V.

		Guilders.
Botanical Garden proper and Tijbodas garden:		
Chief	5,400	
Assistant chief	2,400	
Gardener	1,800	
Labor (Buitenzorg)	9,600	
Labor (Tijbodas)	840	
		20,040

Division VI.

Bureau, library, photography:		
Chief	2,400	
Photographer	3,600	
Assistants	900	
Labor	2,100	
Books, equipment, etc	12,000	
		21,300

Division VII.

Forest flora:		
Chief	6,000	
Botanist	6,000	
Traveling expenses, etc	7,000	
		19,000

Division VIII.

Laboratory for Deli tobacco:		
Chief (botanist)	12,000	
Chemist	8,000	
Assistant chemist	4,200	
Assistant chemist	3,000	
Expenses	2,400	
		29,000

Division IX.

Laboratory for the study of coffee:		
Chief	9,600	
Botanist	7,200	
Expenses	5,700	
		22,500

Division X.

Laboratory for agricultural zoology:		
Naturalist	9,000	
Expenses	1,000	
		10,000

Publications.

Annales	1,500	
Mededeelingen and Verslag	1,500	
		3,000
Construction and repairs	10,000	
Extraordinary expenses	7,200	
		17,200
Total		215,140

PUBLICATIONS.

1. Verslag.
2. Annales du Jardin Botanique de Buitenzorg.
3. Mededeelingen uit 's Lands Plantentuin.
4. Icones Bogoriensis.
5. Bulletin de l'Institute Botanique de Buitenzorg.
6. Korte Berichten.

The *Verslag* (Annual Report) dates from 1868, when it was but a four-page pamphlet, giving a list of accessions to the garden, etc. The publication increased gradually until 1882, when the form was changed, and to the general report of progress, accessions, etc., was added the results of special investigations—for instance, "A study of gutta-percha," "A study of jute culture." This publication, the annual volumes of which average some two hundred and forty pages, is in the Dutch language.

The *Annales* is purely scientific in its character. Its publication was commenced in 1876 and it has now reached its seventeenth volume. Articles in this publication must be in either French, German, or English—certainly a remarkable provision—and contributions are thus received from many scientists not connected with the Buitenzorg institution. Since the establishment of this journal many important articles have appeared in its pages on systematic botany, physiology, morphology, ecology, and embryology. The publication is quite essential to all botanists who are working on the flora of the Indo-Malayan-Australian region, which includes the Philippines.

The publication of the *Mededeelingen* (Communications) was commenced in 1884, and has now reached to No. 56, the individual volumes extending from small numbers of 50 pages to volumes of over 700 pages. The greater part of this publication is in the Dutch language, although technical botanical descriptions are in Latin. A great variety of subjects is covered, in fact nearly all lines of agricultural investigations, chemistry, botany, etc. A few titles will serve to give an idea of this work: "Enquiry concerning the gutta-percha-producing trees of Padang"; "The leaf disease of coffee"; seven volumes on "Contributions to the knowledge of the forest flora of Java"; "History of the garden"; "Nutmeg culture"; "The birds of Java"; publications on tobacco, tobacco soils, poisonous plants, etc.

The *Icones Bogoriensis* consists of plates and descriptions of new, rare, or especially interesting plants. The publication of this serial, now in its fourth volume, was commenced in 1897.

The *Bulletin* was first issued in 1898 and has now reached No. 15. This publication consists of technical articles on chemistry, botany, etc., published in German, French, or English. The size of the bulletin varies from 10 to 80 pages.

The *Korte Berichten* (short notices) are printed in *Teysmannia*, a periodical published in Batavia, and not strictly a publication of the bo-

tanical garden, yet the greater part of the articles that appear in its pages are written by attachés of the Buitenzorg institution.

In addition to the above serial publications many miscellaneous books and pamphlets have been published by the institution, among which are the following: "Catalogue of the Library," 370 pages, with yearly supplements since 1894; "Seventy-fifth Anniversary of the Establishment of the Garden," 1893, 426 pages; "Catalogue of the Phanerogams Cultivated in the Garden," 60 pages (incomplete); "Prodrome de la Flora Algologique des Indes Neerlandaises," 277 pages; "Hand Guide to the Botanical Gardens," 36 pages.

LABORATORIES.

For many years but one or two laboratories existed at Buitenzorg, and as late as 1890 there were but four; to-day the following laboratories exist, all with modern equipment: Agricultural chemistry, pharmacology, agricultural zoology, vegetable pathology and physiology, botanical laboratory reserved for foreign investigators for personal work, laboratory for the study of tea, laboratory for the study of rice, and laboratory at Tjiboda for the study of the virgin forest. At present a large building is in course of construction to be devoted to agricultural chemistry.

THE HERBARIUM.

The herbarium, containing approximately two hundred thousand specimens, consists of the old or great herbarium, which is deposited in the botanical museum; the new, or forest flora herbarium, which occupies a separate building at the present time, but eventually will be combined with the great herbarium; the "garden herbarium,"species cultivated in the laboratory for the use of foreign scientists;; and the "Herbarium Borgoriense," a collection of the plants growing in the vicinity of Buitenzorg.

The arrangement of the herbarium is strictly alphabetical under families, genera, and species—the system followed in publication being that of Bentham and Hooker. The old, or "great herbarium," consists of plants collected between 1845 and 1858 by Zollinger; the rich collections made by Teysmann, 1854 to 1877, in all parts of the Archipelago; the specimens of Kurz, Scheffer, Hallier, Niewenhaus, Burck, Treub, Van Romburgh, and others, and a great quantity of duplicates from Calcutta, Kew, Singapore, Berlin, and Melbourne, representing the flora of British India, the Malayan Peninsula, New Guinea, Australia, and some material from North and South America, but practically none from the Philippines.

The museum contains about 1,500 specimens of dried fruits, 1,500 alcoholic specimens, 250 specimens of vegetable fibers, 200 specimens of gutta-percha, 200 specimens of caoutchouc, etc.

In the forest flora herbarium, which contains only specimens from Java and Maedura, a most careful record is kept of all collections, and

for convenience but two series of numbers are used—one the "Herbarium Koordersianum" and one the "Herbarium variorum," the former now numbering from 1 to nearly 40000, the latter from 1 to about 500. Each collection has a distinctive label. The method of building up the collection is as follows:

The "Herbarium Koordersianum."—Either Dr. Koorders himself collects the specimens or some native collector is sent out with the usual botanical equipment, and also a series of consecutively numbered field labels, always numbering from 1 to 500, 1000, or 2000, according to the length of time the collector is to be out. By providing these consecutively numbered labels, all chance of duplicating numbers in the field is avoided. The first specimen collected receives label No. 1, the second No. 2, etc. When the collection is brought in it receives in addition to the "field number," a museum number of the "Herbarium Koordersianum." The collector's number is preserved in the records, and on the herbarium specimen, but the museum or "Herbarium Koordersianum" number is the only number used in the distribution of duplicates to other botanical institutions, and all reference to the specimens are made by the use of this latter number, which is entered in a register, with references to the collector and his field number. For example, at a certain date the "Herbarium Koordersianum" register numbers 15500, and at this date a collection of 1,100 specimens is brought in by some field collector; No. 1 of this collection receives the new number, 15501, and so on until the new collection has been incorporated in the "Herbarium Koordersianum" series.

The "Herbarium variorum."—This is of course combined with the general forest flora herbarium, and is similarly numbered, but with a different series. For instance, some Army officer sends in 50 plants; these are numbered "Herbarium variorum" from 1 to 50. Later some civil official may send in 100 specimens; these are numbered from 51 to 150, with, of course, the collector's name and date preserved. By this method a very careful record can be kept of all accessions.

The original field labels are pinned to the herbarium sheet, and all references, labels, and tags on the sheet receive the register number, either of the "Herbarium Koordersianum" or "variorum," as the case may be. These labels are not attached permanently because often it is of importance that they be removed when one is working up some genus or species, in order that he may have all the references to the genus or species in question before him at one time. By reference to the register and the herbarium number, the labels can readily be reattached to their proper sheets. The permanent labels are always pasted to the sheet on the lower right-hand corner, as in American herbaria.

In the general herbarium the specimens are mounted on paper of rather poor quality but of the standard size—11½ by 16½ inches. The speci-

mens are attached to the sheets by gummed strips of paper, while all labels are attached to the sheets by pins. This method of mounting plants is rather unsatisfactory, as with age the specimens become brittle and the leaves, flowers, and fruits of many of the specimens readily drop off and become lost. Labels attached with pins can not be considered permanent, as in the course of time the pins corrode, causing the paper to break and allowing the label to become detached. In the forest flora herbarium the specimens are attached to the sheets by glue and in addition gummed strips, while the permanent labels are pasted to the sheet. I have instituted in Manila the latter method of mounting, and find it most practical and at the same time the most permanent method of preserving specimens.

Wooden herbarium cases are not used, but in both herbaria are hundreds of tin boxes about twenty inches long, twelve inches wide and seven inches deep. These boxes are arranged in suitable frame cases, those in the old herbarium extending entirely around the balcony or second floor of the museum building, those in the new herbarium in stacks extending in parallel rows in the herbarium room. The boxes open at the end, being hinged at the bottom, provided with a suitable fastener at the top and a proper label holder in front.

In preserving fleshy material alcohol has been found to be the only practical preservative for use in the Tropics. Experiments have been made here with various compounded preservatives containing alum, picric acid, etc., and also with formaldehyde, but all have proved unsatisfactory except alcohol. Alcoholic material is permanently preserved in glass bottles, museum jars, etc., but in the field zinc collecting cases are always used. In collecting alcoholic material the fruits or flowers receive the field number of the herbarium specimens prepared from the same plants, and are then wrapped in thin paper and numbered again, in order to avoid errors, before they are placed in the alcohol; later the specimens receive the same museum numbers as the herbarium specimens.

Before the specimens are mounted they are poisoned by immersing for two or three minutes in a saturated alcoholic solution of corrosive sublimate. For this purpose a hollow log is used, the size of the trough being about twenty inches long, thirteen inches wide, and eight inches deep. Into this is poured the sublimate solution, and then the plants, each with a proper label, are placed on thin bamboo frames and immersed for the required time; then removed and placed in driers until thoroughly dry, then being mounted. In doing this work great care is exercised to avoid contact with the solution, the specimens being transferred from the bamboo frames to the driers by means of specially constructed bamboo implements. As each specimen is mounted, a small label is attached, giving the date of poisoning, initialed by the person who poisoned the specimen.

COLLECTING.

Much of the botanical collecting is done by natives. For preserving alcoholic material in the field, a zinc box 47 by 34 by 30 cm., tightly fitted into a stout wooden chest, with suitable handles, hinged cover, and proper fastener, is used. The cover of the zinc box is in one piece, entirely removable, and when not in use this box is hermetically sealed with paraffin or other suitable material of a similar nature. In preserving alcoholic material there is first placed in the box a layer of cotton, common "capok" fiber (from *Ceiba pentandra Gaertn*), or other absorbent material, which is saturated with alcohol. On this are placed the paper packets containing the fruits or flowers to be preserved, each with its distinctive label and number. Another layer of cotton is then placed over them, then another layer of fruit, etc. The cotton is kept only saturated or partially saturated with alcohol. This manner of preserving is entirely satisfactory and far more convenient than the usual method of preserving in alcohol. Usually two or more collecting cases are taken, one for very fleshy fruits that would crush easily, and one for the more solid varieties.

For transporting dryer papers, species sheets, etc., tin boxes fitted into suitable stout wooden chests are used. These tin boxes are 66 cm. long, 42 cm. wide, and 28 cm. high, and each will accommodate two stacks of the ordinary Chinese drying paper. In these boxes the driers and presses are placed at night, when the atmosphere is saturated with moisture, or during a rain. This protection of the drying paper is quite essential for the preparation and preservation of good botanical material under tropical conditions, as the drying paper and specimens very readily absorb atmospheric moisture.

Primarily, the 's Lands Plantentuin was a botanical garden pure and simple; and in its early history, although some attention was given to the introduction, cultivation, and dissemination of plants of economic value from other countries, its chief object was the study of systematic botany. As was the case with the many botanical gardens established by the English in the Tropics, this institution, as the flora of the country was worked up, gradually increased its work on economic lines, until to-day, although much attention is given to systematic botany, morphology, embryology, ecology, etc., the greater part of the work done is of an economic nature: the establishment, development, and maintenance of the botanical garden being simply a means to an end, namely, the application of science to the economic agricultural questions of the day.

The great advantage of having practically all the investigations in agriculture, botany, chemistry, and allied sciences conducted by one institution, thereby avoiding the necessity of duplicating libraries, laboratories, and laboratory equipment, and obtaining the greatest results with the least expenditure of money, is at once apparent.

In the Island of Java there are two experiment stations for sugar; one in East and the other in West Java, and an experiment station for cacao; all of which are independent of the institution of Buitenzorg. The forestry bureau situated at Batavia and having charge of the Government forests is also an independent institution, although all of the botanical work of that office is done at the 's Lands Plantentuin by Drs. Koorders and Valeton. These independent investigations form only a very small part of the total investigations now being carried out in Java; all the rest of which are directly under the supervision of Dr. M. Treub and his corps of able assistants, and under the auspices of the 's Lands Plantentuin at Buitenzorg.

I have here several acknowledgments to make—to Capt. George P. Ahern for the interest he has taken in identifying this material and in granting me authority to make the trip to Buitenzorg; to F. Lamson-Scribner, Chief of the Bureau of Agriculture, for allowing me so to arrange my work in his Office as to make it possible for me to make the trip; to Dr. P. van Romburgh, acting director of the 's Lands Plantentuin for granting me access to the library and herbarium of that institution; and to Dr. S. H. Koorders, in charge of the forest flora investigation in Java, for aid in identifying some of the more difficult and imperfect specimens, enumerated in Part II of this bulletin.

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PLATE IX.

FIG. 1.—THE MAIN DRIVEWAY IN THE EXPERIMENT GARDEN.

FIG. 2.—YOUNG PLANTS OF FICUS ELASTICA IN THE EXPERIMENT GARDEN.

PLATE X.

FIG. 1.—GUTTA-PERCHA TREES IN THE EXPERIMENT GARDEN.

FIG. 2.—SHOWING THICKNESS OF PLANTING IN THE EXPERIMENT GARDEN.

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